

1100 WATER MAIN WORK

The following provisions apply to the construction of all water mains and appurtenances, chambers, service branches and contingent work.

Add:

Item 1100 General Provisions

1100.01	General
1100.02	Materials
1100.03	Plans and Standard Drawing
1100.04	Construction

1100.01 General. Before beginning any work under the Contract, the Greater Cincinnati Water Works (GCWW) will furnish plans to the Contractor showing approximate location of existing water mains, chambers, service branches, and other existing GCWW installations pertinent to the Contract. Examine the site with the GCWW Inspector and note the condition of all GCWW appurtenances.

The Contractor is responsible for the proper care and maintenance of all GCWW appurtenances that are found to be in good condition, and for those repaired or replaced during construction.

Note the condition of existing paving, not to be removed or replaced by a street improvement contract. When the work takes place in a political subdivision other than the City of Cincinnati, a representative of that political subdivision should be present. Upon completion of the project, the area in the vicinity of the project shall be in as good or better condition than existed prior to the beginning of work.

After the Contract has been awarded, and prior to starting the work, the GCWW Engineer will schedule a preconstruction meeting with the Contractor, representatives of the political subdivisions, and utility companies involved. The purpose of this preconstruction meeting is to discuss construction site safety, construction schedules, traffic control, and other aspects of the work that may concern the interested parties present.

Obtain all licenses and permits necessary to complete the work unless otherwise noted on the approved GCWW Contract Plans.

Maintain traffic in a method approved by the authority having jurisdiction, or as specified in the Contract Plans. Maintain proper and adequate access across all roadways, sidewalks, and driveways serving business concerns in the construction area. Install temporary sidewalks, wooden ramps, or bridges to allow the movement of pedestrian traffic at all times, taking special consideration regarding the safety of school children.

For all water main work, labor, and material conform to the standard drawings, specifications, and supplements which are the most current at the time of the opening of the proposals. Purchase copies of these items from the Greater Cincinnati Water Works (GCWW), 4747 Spring Grove Avenue.

1100.02 Materials. Furnish all material, unless otherwise specified in the item itself or on the approved GCWW Plans. Material to conform to the applicable City of Cincinnati Department of Purchasing Specification and/or GCWW Standard Drawings. All material must be inspected and approved by GCWW before installation. Pay all charges for shop and field inspection by GCWW personnel, where applicable.

On a concrete water main project, coordinate all details related to the approval process of the pipe laying schedule, pipe manufacturing, material delivery, and off-loading and storage.

Haul all items furnished by the GCWW from a GCWW distribution storage yard to the work site. The Contractor will be paid for this hauling, except copper service branch material, under Item 1102.

Responsibly manage all materials issued and return all excess material to the GCWW for credit. Any material lost, stolen, damaged, or broken will be deducted from the final payment at the current price paid by the GCWW including an additional 33 percent for handling and storage.

1100.03 Plans and Standard Drawings. The underground utilities which are part of the Contract drawing have been shown in accordance with Section 153.64 of the Ohio Revised Code. In accordance with this Section, notify the Ohio Utilities Protection Service (OUPS) and/or the affected utilities two working days prior to commencing construction operations.

All utility information has been shown on the Contract plans from information provided by the owner of each utility. In cases where utility information is incorrect and it results in a change in the Contract plans, notify the owner of the utility to determine the necessary course of action. Submit any subsequent claims as a result of downtime or additional work to the owner of the conflicting utility. The Greater Cincinnati Water Works will not accept claims for any utility other than those as a result of incorrect water main and related appurtenance information.

The proposed locations of mains, valves, connections, fire hydrants, and water services, as shown on Contract drawings, are diagrammatical only. The final locations are subject to field conditions and will be determined by the GCWW Inspector as work proceeds.

Standard drawings concerning construction and installation details for water main work are on file in the Engineering Division of the Greater Cincinnati Water Works, 4747 Spring Grove Avenue, or the City Purchasing Department, and are available for reference or purchase.

1100.04 Construction. The amount and extent of new water main work will be shown on the Plans.

The Contractor's work hours are subject to the approval of the Director. The Director has the authority to direct the Contractor's forces to perform any work that, in his or her judgment, is necessary. The Director also has the authority to order the Contractor to increase or decrease the work forces at such locations that he may indicate.

All water main work shall be done in strict accordance with the specifications of the GCWW and under their direction, supervision, and inspection.

Adjust all chamber castings, valve boxes, fire hydrants, and water service boxes as indicated on the Plans. Those items to be salvaged or relocated will be so indicated on the Plans.

All valves in the Greater Cincinnati Water Works system will be operated by qualified GCWW personnel only.

The GCWW cannot, however, guarantee that all operated valves will provide a watertight shutdown. Every effort will be made to make a shut-down as quickly and effectively as possible. No allowance will be made to the Contractor for any delay in closing a valve.

Provide sufficient notice when a shutdown of valves will be required for any work activity.

Before the GCWW will schedule a shut down for tie-in purposes, the Contractor will be required to have all the necessary materials required to complete the tie-in on site to be approved by the GCWW Inspector. A shut down will not be scheduled if the Contractor does not have all the required approved materials on site.

Include all costs and charges for the restoration of street paving, sidewalks, or other areas opened or disturbed in the pursuance of water main work in accordance with the Plans, in the unit bid prices of the various items in the Proposal.

GCWW understands that differing site conditions sometimes result in extra work/change orders to the project. Change Orders on GCWW Contracts will be prepared and submitted in strict accordance with Section 109.05 C of the State of Ohio Department of Transportation Construction and Material Specifications dated January 1, 2008, or most recent edition and as modified in this City of Cincinnati Supplement. GCWW limits the mark up on wages and fringe benefits as described in 109.05 C. 2. "Labor" to 30 percent. It is expressly understood that, regardless of the nature of the claim or change in scope of work, the Contractor is not entitled to compensation for loss of anticipated profit or production.

Item 1101 Laying Pipe and Fittings

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1101.01 Description. This work covers the furnishing of all necessary labor, material, tools, and equipment required in laying various sizes of water mains and fittings. This work consists of unloading of material, proper storage of all pipe and fittings, excavating the trench, locating all utilities within the alignment of the proposed main, laying and joining the pipe, installing polyethylene wrap, cutting and removing existing pipe, making necessary connections and backfilling the trench, the repairing or replacing of all drains, sewers, utilities, and any other structures that may be disturbed or damaged by the Contractor's operations, and restoration of all disturbed surfaces. Include in this item the disposition of excavated material, testing and chlorinating the pipe in place, where applicable, installation of water mains and fire hydrant leads, as shown on the Plans, or as directed by the GCWW Director. Include in this item all costs associated with the maintenance of traffic in accordance with applicable permits and specifications.

When welded joints are required, retain the services of a testing agency, designated/approved by GCWW, to perform testing of all welds. Include the cost for this service in the unit bid price per lineal foot (meter) of laying pipe.

1101.02 Responsibility for Material.

1101.021 Materials Furnished by Contractor. Schedule the delivery of all material, including pipe and fittings. Coordinate the delivery with the GCWW. Be responsible for all material furnished. All material must conform to the requirements of the GCWW specifications. Furnish certification, analysis, and characteristics of all material. Material that has not been previously inspected and approved by GCWW will be inspected and approved at the job site. The GCWW Inspection Office requires 48 hours notice for this inspection and charges, when they apply, will be billed to the Contractor in accordance with Section 401.13 of the GCWW Rules and Regulations. All materials that may come into contact with potable water must be accompanied by certification prior to approval and installation.

1101.022 Materials Furnished By GCWW Be responsible for all material furnished by the GCWW.

Inspect all material furnished by GCWW and reject all defective material. Arrange for shipment of "piggy-back" trailers.

Responsibility for all material remains with the Contractor until final acceptance of the work by the City, and all surplus material furnished by the GCWW is returned to the GCWW Distribution Storage Yard and judged to be in proper condition.

1101.03 Unloading and Storage of Materials. Provide all labor, material, and equipment to unload pipe, valves, fittings, castings, or other appurtenances not unloaded by the pipe manufacturer. Use suitable slings, hooks, clamps, or skids, as approved by the GCWW Inspector, on all material. Under no circumstances will any pipe, fittings, valves, castings, or other appurtenances be unloaded by dropping from the trailer or truck bed.

Handle pipe and fittings so that the coating and lining are not subject to damage. If any part of the coating or lining is damaged, repair or replace such material in a manner satisfactory to the GCWW Inspector, at no cost to the GCWW.

Place all pipe and fittings on the job site on blocks and suitably chock to eliminate any possibility of rolling or shifting. Blocks and chocks shall have a minimum thickness of two inches (51 mm) and shall be high enough to assure that the pipe and fittings will not be touched by surface drainage.

Do not store any material within the public Right of Way, including sidewalks, unless previously approved by GCWW or as indicated on the approved Plans.

1101.031 Staking of Proposed Water Main.

On all Water Works Contracts, staking of the proposed water main is performed by GCWW or its representative.

On all private developments, standard water main staking consists of the following:

- 1) All staking must be performed by a licensed surveyor.
- 2) Place a hub with lathe every 50 linear feet (15.2 m) unless in a radius or cul de sac. When staking a radius or cul de sac, place a stake every 25 linear feet (7.6 m), or less as directed by the GCWW Inspector.
- 3) Stake all "specials" (fittings, fire hydrants, valves, etc.) in addition to the dimensioning requirements under 2 above.
- 4). Identify hub with lathe as follows:
 - a) Station identification.
 - b) Ten foot (3 m) offset to centerline of proposed water main or fire hydrant.

- c) The appropriate cut/fill to finished grade over the water main or fire hydrant.
- 5) Install water main when rough grade on site is within one foot (305 mm) of the proposed final grade.
- 6) For proposed service branches, place a "blue top" stake, provided by GCWW, at the location of the proposed curb stop. Place a ten foot (3 m) offset stake directly back from the blue top stake. Identify the proposed cut or fill over the curb stop on the offset stake.

For street improvement projects, staking water mains is performed in the same manner as on private developments. Additionally, place a nail (or tack) in the existing pavement identifying proposed line and grade.

1101.04 Excavation and Preparation of Trench.

Description. The general proposed location of the pipelines and connections to the existing pipelines are shown on the Plans. If, during the course of work, unforeseen conditions arise, the location of the pipeline may be changed as directed by the GCWW Director to meet such conditions.

Proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined.

Excavation. Excavation includes the loosening, handling, rehandling, removal, filling, and disposal of any and all materials, wet or dry, including gumbo, quicksand, hardpan, shale, rock, roadway pavement, granite blocks, cobblestones or brick pavers, street car rails, abandoned structures, and all unforeseen obstacles.

It is the nature of construction that unmarked utilities or utilities not shown on the plans may be encountered within the excavation for the proposed work. Identify and remove any abandoned utilities encountered that cross the excavation. No extra payment will be made to the Contractor for the identification and removal of the abandoned utility. Include all costs for this work in the unit price bid for the appropriate Item 1101.

Remove rock or boulders encountered at the bottom of the trench and provide at least 4 inches (102 mm) embedment below the bottom of the pipe. Fill all voids left by the removal of rock and boulders with backfill gravel or embedment material compacted in 4-inch (102-mm) lifts.

Make all excavation by open cutting or trenching except where tunneling is required on the Plans or directed by the GCWW Inspector.

Maintain test holes or excavate trench a minimum of 50 feet (15.2 m) in advance of pipe laying, to assure proper clearance between the water pipe and any utility crossing, or underground structure. Brace and support all utilities and structures. Obstructions encountered during the installation of the main, due to the failure of having 50 feet (15.2 m) of trench excavated ahead of laying operations, may require removal and relaying of the pipe at the at

the Contractor's expense.

All labor and material necessary to alter the water main utilities, or structures, due to failure of the Contractor to comply with these regulations is the responsibility of the Contractor.

Disturbed Pavement and Trench. The following dimensions of disturbed pavement will normally be allowed. Reference bid documents for more specific details.

- (1) Do not disturb street pavement or sidewalk for a distance of more than 200 feet (61.0 m) ahead of the last laid pipe.
- (2) Complete backfill within 50 feet (15.2 m) of the last laid pipe.
- (3) Install temporary or permanent surface restoration within a distance of 200 feet (61.0 m) of the laid pipe, including those areas where main installations occur within a closed lane or closed street condition. Use roadway plates only as a temporary measure and for a period not to exceed 24 hours, unless otherwise authorized by GCWW.

Widths and Depths. Excavate to a sufficient width and depth to facilitate construction of the work to the lines, grades, and dimensions shown on the Plans, GCWW Standard Drawings, or as directed by the GCWW Inspector. In those cases where profile grades are not indicated on the Plans, the nominal widths and depths of trenches will be as follow:

Pipe Size	Cover Over Pipe	Clearance Under Pipe	Clearance Either Side of Pipe
12 inches (305 mm) and Under	3'-6" (1.067 m)	4 inches (102 mm) minimum	6 inches (153 mm) minimum
16 inches (406 mm) and Over	4'-0" (1.219 m)	4 inches (102 mm) minimum	6 inches (153 mm) minimum

Excavate chambers to a size that will facilitate the construction of the chambers to the dimensions specified on the GCWW Standard Drawings or as shown on the Plans.

Bell Holes.

Mechanical Joint and Compression Joint. Bell holes shall conform to the following dimensions:

Length = three feet (914 mm) – two feet (610 mm) in front of joint to one foot (305 mm) behind joint.

Width = six inches (152 mm) each side of pipe barrel.

Depth = six inches (152 mm) below pipe barrel.

Welded, Mechanical Coupling, Poured Lead Joints. Bell holes shall conform to the following dimensions:

Length = four feet (1.22 m) centered at joint.

Width = 18 inches (457 mm) each side of pipe barrel.

Depth = 18 inches (457 mm) below pipe barrel.

Blasting. Secure the approval of the proper authorities before blasting for excavations. Take the proper precautions to protect all people and property.

Additional Excavation. If any excavation is carried below the depth indicated on profile because of field changes ordered by the GCWW Inspector, or because of unsuitable soil conditions, the Contractor will be compensated under Item 1119.

Pipe Laying in Areas Where Grading Is Necessary. When a street is being improved or where new streets are being constructed, install water mains only when the proposed subgrade has been properly prepared as stated in the specifications. Under no circumstances will any rolling or compacting by grading equipment be allowed after water main is laid.

Excavation in Unsuitable soil. Where the trench is found to be unsuitable or includes ashes, cinders, refuse, vegetable or other organic material, excavate and remove such material to a depth of an additional three inches (76 mm) to six inches (152 mm) below normal trench bottom and an additional four inches (102 mm) either side of the normal trench width.

Before installing the pipe, backfill the additional subgrade with backfill gravel in three-inch (76-mm) uncompacted layers. Thoroughly tamp the layers, as directed by GCWW Inspector, to provide continuous bearing and support for the pipe when pipe installation and final backfilling operations commence.

If, in the opinion of the GCWW Inspector, the bottom of the trench at subgrade is found to consist of material that is unstable to such a degree that it cannot be removed and replaced with granular backfill to support the pipe properly, then construct a foundation for the pipe, consisting of timber, piling, or other materials. GCWW will compensate the Contractor for the timber and piling under Item 637, for the concrete under Item 1110, and for the additional excavation and necessary backfill under Item 1119.

Sheeting and Bracing. Furnish, place, and maintain such sheeting and bracing as may be required to securely support the sides and ends of the excavations, to prevent injury to persons, and damage to property or to the structure being built. Install additional sheeting and bracing as deemed necessary by the GCWW Inspector. Compliance with such orders or failure on the part of the GCWW to issue such orders shall in no case release the Contractor from his liability for damages resulting from weak or insufficient sheeting, nor from his responsibility for protecting the work and adjacent property from damage. Immediately and completely fill voids appearing outside of the sheeting with suitable material in a satisfactory manner. Sheeting and bracing may be left in place at the option of the Contractor unless otherwise ordered by the GCWW Inspector. Remove sheeting and bracing only when sufficient backfill has been placed to provide ample support to the sides of the excavation. When sheeting is left in place, cut off a minimum of two feet (610 mm) below the proposed finished surface. Sheeting and bracing ordered left in place is paid for under Item 637.

Shielding. Furnish, place, and maintain such shielding as may be required to securely support the sides and ends of the excavations, and to prevent injury to persons, and damage to property or to the structure being built. Immediately and completely fill voids appearing outside of the sheeting with suitable material in a satisfactory manner. Remove shielding only when sufficient backfill has been placed to provide ample support to the sides of the excavation.

Tunneling. Construct water mains in tunnels only when so indicated on the Plans or as directed by the GCWW Director.

When tunnels are constructed without the benefit of steel casing or tunnel liner plates, backfill the pipe area as specified in the GCWW Standard Drawings, and the balance of the area above the pipe with Class T under Item 1110. Ram the concrete portion of the backfill tightly against the undisturbed earth.

Construct tunnels using steel casing or tunnel liner plates as directed in Items 1107 and 1108.

Do not install water mains in any area where final grades have not been established and where grading has not been performed to provide nominal cover over water main when the street is built.

1101.05 Laying Pipe and Fittings, General. Provide and use proper tools and facilities for the safe and convenient performance of the work. Carefully lower all pipe, fittings, valves, and hydrants into the trench by means of derricks, ropes, or other suitable tools or equipment, in such a manner to prevent damage to the water main materials and protective coating and lining. Do not drop or dump water main material into the trench, under any circumstance.

Brush all pipe and fittings to remove all foreign matter and carefully examine for cracks and other defects while suspended above the trench, immediately before installation. Take every precaution to prevent foreign material from entering the pipe while it is being placed into the trench.

Wrap all ductile iron pipe and fittings with polyethylene in accordance with GCWW Standard Drawing 105-5 and 105-5A. Wrap each pipe with polyethylene just prior to installation. Pre-bagging of multiple pipes is not permitted.

When pipe installation is not in progress, close the open ends with a watertight plug or other means approved by the GCWW Inspector.

If water is in the trench, leave the seal in place until the trench is pumped dry.

When foreign material and/or ground water enters the newly laid pipe, prior to filling and testing, poly-pig the entire pipeline to remove all possible contaminants at the Contractor's expense. Upon successful completion of the cleaning operation, GCWW will rechlorinate the pipeline at the Contractor's expense.

Carefully wipe clean and dry the ends of the pipe before joining.

Pipe Embedment. Construct the trench with a flat bottom conforming to the proposed grade of the water main. Place the embedment material in the area of the pipe to a depth conforming to the dimensions as specified in Item 1101.04, and as shown on the applicable GCWW Standard Drawings.

Mechanically compact all embedment material and grade the surface to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints.

Where embedment material exceeds four inches (102 mm) below the bottom of the pipe barrel, place and mechanically compact additional embedment material in four-inch (102-mm) layers.

After each pipe has been graded, aligned, and placed in its final position, place and mechanically compact embedment material to a depth of four inches (102 mm) above the top of the pipe. Use special care in placing this portion of backfill so as to avoid damaging or moving the pipe.

Complete the trench backfill above the pipe embedment conforming to Item 1101.071 and to the applicable GCWW Standard Drawing. Strictly adhere to all restoration sections on GCWW Contract Plans.

Blocking and Wedging. Place fire hydrants, valves, and fittings on hardwood blocks. Hold fire hydrants, valves, and fittings in position with hardwood wedges. Bed the blocks firmly in the bottom of the trench with uniform bearing and with the long dimension of the block perpendicular to the pipe barrel. Ensure that the blocks are level across the trench and place the proper number of blocks, one upon the other, to bring the fittings to the required grade.

Conform to the minimum dimensions indicated below for blocks and wedges:

Block Dimensions

Pipe Size	Thickness	Width	Length
4 inches thru 10 inches (102 mm thru 254 mm)	2 inches (508 mm)	6 inches (152 mm)	12 inches (305 mm)
12 inches thru 20 inches (305 mm thru 508 mm)	2 inches (508 mm)	1/2 of Pipe I.D.	I.D. of Pipe
24 inches (610 mm) and larger	2 inches (508 mm)	12 inches (305 mm) minimum	I.D. of Pipe

Wedge Dimensions

Pipe size	Thickness (Taper)	Width	Length
4 inches thru 20 inches (102 mm thru 508 mm)	1-3/4" to 0" (45 mm to 0 mm)	4 inches (102 mm)	6 inches (152 mm)
24 inches (610 mm) and larger	1-3/4" to 0" (45 mm to 0 mm)	4 inches (102 mm)	6 inches (152 mm)

Deflection at Pipe Joint. The maximum permissible joint opening for a regular pipe joint is 1/2-inch (13-mm). Do not exceed Manufacturer's recommendations for joint deflections at special couplings. Do not deflect joints on either side of all valves.

Special Construction for Restraining Fittings. Under some construction situations, restrain a fitting by clamping, bolting, or tie-rods. Furnish the necessary material unless otherwise indicated on the Plans. Furnish all labor and equipment necessary to install this material.

Submit design and material specifications to the GCWW for approval before installation.

Coat all exposed surfaces of the restraining devices with Sherwin-Williams High solids Catalyzed Epoxy Paint (two-part mix NSF 61 approved). Apply all coating material to Manufacturer's recommendations.

Valve Installation. Install all valves with the valve-operating stem as truly plumb as practical.

In the installation of valves 16 inches (406 mm) in diameter and larger, pour the concrete floor of the valve chamber and allow to "set" before placing the valve. Precast floors are acceptable.

Test Holes. Dig test holes along the line of the proposed water main a minimum of 50 feet (15.2 m) ahead of the last laid pipe, including all connection points, to ascertain the location and elevation of utilities crossing the proposed water main. These excavations are considered necessary for water main installation. Include cost for all test holes in the Contract price bid for "Laying Pipe and Fittings". The GCWW will not accept a claim for different utility conditions encountered when test holes are not performed as required.

When the Plans specifically indicate that a test hole must be dug, or in other places where the GCWW Inspector deems necessary, GCWW will compensate the Contractor at the Contract price bid for Item 1120.

Cutting of Pipe. Cut all pipe and special castings necessary to install the water main as shown on the Plans or as directed by the GCWW Inspector. Include the cost for this work in the Contract price bid for "Laying Pipe and Fittings".

The GCWW Director must approve the method of cutting pipe. Do not use cutting torches or electrical devices to cut gray or ductile iron pipe.

Removing Existing Pipe. Cut and remove any existing water main normally in service to facilitate the connecting or joining of the new installation to existing water mains.

Carefully cut and remove the existing pipe at the point designated for the connection. Do not damage valves, specials, or pipe that is to be left in service. Assume responsibility for any such damage.

Remove any abandoned water mains encountered in the excavation for the proposed water

main.

All pipe and fittings removed are the property of the Contractor, except for those that are salvaged under Item 1118.

Include the cost for removing water mains in the Contract price for "1101 - Laying Pipe and Fittings."

Air Cocks. Install air cocks where shown on the Plans and at all other high spots that may occur in laying of pipe. Include the cost for ferrule installation in the Contract price bid for the appropriate Item 1101.

Install air cocks in the connections provided by the pipe manufacturer in concrete and steel pipe. GCWW will compensate the Contractor for constructing the chamber under Item 1111.

Reconstruction of Subsurface Structures. While installing the water main it becomes necessary to alter or reconstruct a culvert, sewer manhole, valve chamber, catch basin connection, water main, water service, or sewer tap connections, in the same or new location, perform the work upon order from the GCWW Inspector. The Contractor will be paid for such work at the Contract price bid for the following applicable Items: 1101, 1126, 1110, 602 and 1123. GCWW will not compensate the Contractor for any alteration or reconstruction done for the convenience of the Contractor.

Obtain the written consent of the Owner before changing the position of any utility not specifically called for on the Plans.

Sealing Abandoned Utilities. Seal open ends of abandoned water mains, or water mains to be abandoned with this project, or any other utility, which are cut because of trenching operations, with a brick or concrete bulkhead. The Contractor shall be compensated for this work under Items 602 and/or 1110.

1101.051 Railroad Crossing. Place the proposed water main in a suitable casing or tunnel liner, as specified on the Plans, when crossing under a railroad track. Item 1107 and Item 1108 specifies material and construction requirements for casing and tunnel liner.

Provide the owner of railroad property adequate notice before proceeding with any work involving the track, right-of-way, and appurtenances. The cost for any special traffic control, supporting devices, or other necessary precautions involving railroad personnel or property, shall be compensated as indicated in the Special Provisions of the Contract Plans.

1101.052 Creek Crossing. Install proposed water mains, under creek beds, in accordance with the Contract Plans or GCWW Standard Drawings. Concrete and reinforcing steel will be compensated for Under Item 1110 and 509. Restrain all pipe joints and fittings per GCWW Contract documents.

1101.053 Maintaining Water Service and Temporary Lines. Maintain adequate water supply to consumers and for fire fighting purposes. Schedule operations to assure that water services and fire hydrants will not be out of service for more than the length of time, which, in the opinion of the GCWW Director, is required for making necessary connections.

When water service may not be interrupted for the length of time required to make connections, the GCWW Director may order the Contractor to furnish, install, and maintain temporary pipelines. These temporary lines shall be of the size specified by the GCWW Director, which will adequately supply water for normal consumption and fire protection. Sterilize all such temporary pipelines to the satisfaction of the GCWW Inspector.

No additional payment will be made for temporary water mains or services unless specifically stated on the Plans or as a bid item in the Contract Proposal.

1101.054 Hydrostatic Test for Leakage and Water Main Flushing. After installation and backfilling operations have been completed, subject all newly laid pipe to hydrostatic pressure 50 psi (344.75 Kpa) greater than the nominal working pressures in the line being tested.

For all mains larger than 20 inches (508 mm) diameter, GCWW will provide the necessary labor and equipment to fill, chlorinate, and pressure test new mains. In the event pressure testing results in a failure by GCWW Standards, the Contractor will be responsible for all costs associated with the GCWW personnel conducting subsequent testing.

On all other mains, provide the necessary labor and equipment for the filling, chlorinating, pressure testing, and flushing operations. Submit all equipment for the approval of the GCWW Construction Inspector.

Perform filling, chlorinating, pressure testing, and flushing operations Monday through Friday, unless otherwise directed by the Greater Cincinnati Water Works.

Isolate the section of pipe being tested, utilizing temporary plugs. Testing against a valve is prohibited.

Open all main line and fire hydrant valves prior to filling operations.

The GCWW Construction Inspector will determine the location of the source water. The source water must contain a minimum system level chlorine residual of 0.2 ppm. Flush the source point, as necessary, until a system level residual is attained. Sample various locations in the proximity of the source point, under the supervision of the GCWW Construction Inspector, to establish the system level chlorine residual. If a system level chlorine residual of at least 0.2-ppm is not attained, contact the Valve Department Supervisor before continuing with the fill.

Once the system level chlorine residual is attained, furnish and install the necessary assembly to begin the filling of the newly installed water main. The GCWW Constructor Inspector shall determine how the main shall be filled (ferrule to ferrule or fire hydrant to ferrule). Furnish equipment including, but not limited to, the following:

1. Brewer Potable Water Hose.
¾ inch I.D. four-ply "Brewer," 300 psi minimum; 50 foot lengths; color: white; heavy duty female couplings on both ends; couplings to fit standard hose bib; tube and cover made from odorless and tasteless rubber with hose being suitable conduit for potable water; Associated Brewers Discharge #9980 with LE-H1/Dixon GHS51 Fittings.
2. Fire Hydrant and Ferrule Adapters
Brass or copper fire hydrant and ferrule fittings/adapters.
3. Fill Line to include a check valve or other approved backflow device.
4. Pocket Chlorine Test Colorimeter (HACH Co., Cat. #46700-00)
(Calibrated by certified GCWW personnel within last 3 months prior to use.)
5. High Test Chlorine Monitor (HACH Co., Model CN-2IP. Cat #24444-00)

Submit all materials to the GCWW Construction Inspector for inspection. Disinfect all material used for filling purposes.

Flush the fill hose until the system level chlorine level is attained. Slowly fill the section of pipe being tested with water and expel all air from the pipe. Open all hydrants and air cocks during filling operations. Close hydrants and air cocks as water reaches each point expelling the air. Once the filling operation is complete, the filled main shall be allowed to remain under working pressure for a period of 24 or 48 hours, as directed by the GCWW Construction Inspector, to permit the concrete lining to absorb water and to allow the escape of entrapped air. At the end of the 24 or 48-hour period, obtain a high chlorine residual reading at each dead end sample point. Pump out all fire hydrants utilized to facilitate the filling process after each use.

All Contractor personnel associated with obtaining chlorine residual readings must obtain training from a certified GCWW Analyst.

Record and maintain all chlorine residual readings obtained. Provide a copy for the GCWW Construction Inspector's daily log.

Begin the hydrostatic test within 48 hours of completion of the filling operation, prior to the high Cl₂ readings. Supply the water for the leakage test through the original source point. Pump the water to a pressure 50 psi (347.75 Kpa) over the working pressure. Maintain the test pressure for a two-hour test period with leakage not exceeding the maximum allowable. In the event that leakage within the maximum allowable can not be maintained, locate and eliminate sources of water loss. Furnish all material, labor, and equipment necessary for this work. Include the cost in the Contract price bid for the appropriate Item 1101.

Repeat the leakage test after locating and eliminating the sources of water loss.

Perform the test unless otherwise indicated on the Contract Plans.

Provide all labor and equipment, including pumps necessary to perform the test. The GCWW will provide the necessary gauges and meters.

Maximum Allowable Leakage Formulas

The maximum allowable leakage in cubic feet (cubic meters), while maintaining test pressure, is defined as:

Ductile Iron Pipe (mechanical joint & push-on joint):
(Based on AWWA Design Standard C600-05)

$$\text{Allowable Leakage } A = \frac{L \times D \times \sqrt{P}}{553,520} \text{ in cubic feet per 2 hours.}$$

Concrete Pipe:
(Based on AWWA Design Guideline M-9 Manual)

$$\text{Allowable Leakage } A = \frac{L \times D}{47,392} \text{ in cubic feet per 2 hours}$$

Where: A = Allowable leakage in cubic feet per 2 hours.
 D = nominal inside diameter of pipe in inches
 P = test pressure in pounds per square inch (psi)
 L = length of pipe line in feet

Provide hydrostatic testing and all related testing equipment. Personnel involved with the testing operations must be certified by GCWW. All observed leaks must be repaired.

HDPE (High Density Polyethylene). Conform to Driscopipe Technical Note #35 – Method 1 – (2) Hour Test (copies of Technical Note are available at the GCWW Construction Inspection Office at 4747 Spring Grove Ave.) for pressure testing of HDPE. Prior to performance of the test, expel air from the pipeline to the satisfaction of the GCWW Construction Inspector, using hydrants or air-cocks. If required, install taps at high points where air relief valves can be used to remove air. Include cost of taps in this Item. Plug taps after testing is complete.

Flushing. Begin flushing of the water main a minimum of 24 hours after the completion of hydrostatic testing. Furnish all equipment for the flushing operation. The necessary equipment includes that previously identified for filling of water mains. The GCWW Construction Inspector will inspect all material. Disinfect all material used for flushing purposes.

Immediately prior to flushing, under the supervision of the GCWW Construction Inspector, establish residual chlorine levels at each of the sample point locations. Attain a minimum of 10.0 ppm at each sample point to initiate flushing. If a chlorine residual below 10.0 ppm is identified, flush the sample point in question until a 10.0 ppm chlorine residual is achieved. Failure to achieve the minimum 10.0 ppm residual will result in GCWW re-chlorination of the

entire main with all material, labor, equipment, and associated costs at the Contractor's expense.

Perform flushing from the original fill source through sample points. The source water must contain a minimum system level chlorine residual of 0.2 ppm. If necessary, flush the source point and the fill hose until the system level chlorine level is attained. Flush the main line section of the water main first down to 1 – 3 ppm. Upon completion of main line flushing, flush the remaining sample points (i.e. side streets and large branches) one at a time, under the direction of the GCWW Construction Inspector, until 1 – 3 ppm is achieved at each location.

Complete flushing prior to noon for same day sample collections. The GCWW Valveroom Dispatcher shall be contacted by the GCWW Construction Inspector at the start of the shift, on the requested sample collection day, to arrange for sample pick-up. First sample collection must also be scheduled to take place between Mondays and Thursdays.

1101.055 Disinfection of Water Mains. Properly disinfect all new water mains and all modifications to existing water mains prior to being placed into service as per AWWA Standard C-651 Disinfecting Water Mains. Specific requirements and modifications are as below.

Thoroughly clean the inside of all lengths of water mains and fittings with a chlorine/water solution prior to installation. Submit cleaning method to GCWW for approval.

Isolate the section of water main being disinfected by means of temporary plugs installed by the Contractor before beginning the disinfecting procedure.

Each dead end point of a new water main requires a temporary one-inch (25-mm) tap to obtain bacteria samples. For concrete water mains, utilize a two-inch (51-mm) tap provided on the bulkhead. Maintain access to the sampling tap. Furnish the necessary ferrules.

Install a one-inch (25-mm) tap ahead of the fire hydrant control valve, where the newly installed water main terminates at a fire hydrant.

Charge new water mains, smaller than 24 inches (610 mm), with chemicals supplied by the GCWW. Fill the new main with water and allow standing for a period of twenty-four hours. When non-liquid chlorine is used and cold weather dates established by GCWW are in effect, the filled main will stand a minimum of 48 hours. All mains 24 inches (610 mm) and larger are charged with liquid chemicals and filled with water by the GCWW, and allowed to stand for a minimum of 24 hours at all times of the year.

The amount of residual chlorine will be analyzed. If the main being disinfected fails to maintain the minimum allowable residual chlorine content, repeat the disinfection procedure.

Be responsible for all costs associated with subsequent testing performed by GCWW personnel in the event that the bacteria testing results in a failure by GCWW Standards.

In the event the residual chlorine is not sufficient after the second disinfection procedure is completed, remove sections of main, fire hydrants, or other appurtenances for proper flushing and possibly poly pigging. Furnish and pay for all material, labor, and equipment necessary for

this work.

After the main has passed the pressure test and is flushed down to system chlorine levels, a bacteria sample will be taken by the GCWW Valve Room personnel at each dead end section of water main. A second and final sample will be taken 24-hours after the first sample. Each sample will require a minimum of 24-hours before results can be obtained, therefore the results of the bacteria samples will not be known for a minimum of 48-hours after the first sample is taken. If all samples show no signs of bacteria the water main will be allowed to be tied-in. GCWW will notify the Contractor when the water main is able to be tied-in.

Include all labor and material necessary to comply with this regulation in the unit bid price for the appropriate Item 1101.

1101.06 Joining Pipe.

General. Join all pipe and fittings in the manner specified by the GCWW. Complete any and all types of joints that are necessary. Joints at connections are specified from available information.

Coating Mechanical Couplings and Closure Assemblies. Coat all exposed steel pipe, couplings, flanges, or bolts, either buried or in chambers, with Sherwin-Williams High Solids Catalyzed Epoxy Paint (two-part mix NSF 61 approved). Apply all coating material in accordance with Manufacturer's recommendations.

1101.061 Joining of Bell and Spigot Pipe. Provide yarning material with the best quality packing braided jute, free of oil and tar. Place the yarning material around the spigot of the pipe using proper dimensions to center the spigot in the bell. Shove the spigot home, driving the yarning material tightly against the inside hub of the bell with a suitable yarning tool.

When a single strand of yarning material is used, provide an overlap at the top of not more than two inches (51 mm). When more than a single strand is required for a joint, cut each strand to sufficient length so that the ends will meet without causing overlap. The ends of the strands shall meet on opposite sides of the pipe, and not on top or at the bottom. Drive home successive strands of yarning material separately.

Fit a lead joint runner (snake) snugly against the face of the bell and the outside of the pipe and dam with clay between the pipe and the runner where required. Build a clay pouring gate as high as the top of the hub of the pipe and not less than three inches (76 mm) along the circumference of pipe and one inch (25 mm) wide.

Lead. No substitute for lead will be allowed in making any poured joint. Obtain a special compound of lead available from the GCWW. Obtain this compound by furnishing the GCWW with an equal amount of pig lead having the following characteristics:

- (1) Soft and malleable.
- (2) Cylinders, two inches (5.10cm) in diameter and three inches (7.60 cm) high, cast

from the pig shall compress not less than 50 percent under a pressure 15,000 psi (103.4 MPa), and no crack shall develop on the circumference of such cylinder under a pressure of 60,000 psi (423.7 KPa).

Heat the lead in a melting pot, kept within easy reach of the joint to be poured, to the proper temperature. Remove all scum before pouring. Make each joint with one continuous pour filling the entire joint space with solid lead. Burn out and repour spongy, stringy, or imperfectly filled joints.

Caulking. After the lead has cooled to the temperature of the pipe, caulk lead joints with pneumatic or hand tools operated by a competent laborer. Utilize a proper set of caulking tools, including a caulking chisel and a series of at least five caulking irons ranging from 3/16 inch (4.8 mm) through 3/4 inch (19.1 mm) in size.

Use the caulking chisel first against the barrel of the pipe, followed by the smallest size caulking iron up through the largest size caulking iron that the joint can accommodate.

After caulking has been completed, the joint must be left neat and even. Joints of all pipe shall be at least 5/16 inch (7.9 mm) thick, as specified below:

Diameter of Pipe	Joint Depth After Caulking
4 inches to 6 inches (102 mm to 152 mm)	2-3/4 inches (70 mm)
8 inches to 24 inches (203 mm to 610 mm)	3 inches (76 mm)
30 inches to 36 inches (762 mm to 914 mm)	3-1/2 inches (89 mm)
42 inches to 48 inches (1.06 m to 1.22 m)	4 inches (102 mm)
Over 48 inches (1.22 meters)	4-1/2 inches (114 mm)

1101.062 Joining of Mechanical Joint Pipe.

Cleaning and Assembly. Thoroughly wire brush the last eight inches (203 mm) outside of spigot end, inside of bell, and the ductile iron gland to remove all oil, grit, excess coating, and other foreign matter from the joint. Paint this area with a non-toxic soap solution. Slip the ductile iron gland onto the spigot end of the pipe with the lip extension of the gland toward the bell end. Paint the rubber gasket with the soap solution. Place the painted gasket onto the spigot end with the thick edge toward the gland.

Bolting of Joint. Push the entire section of the pipe forward to seat the spigot end in the bell. Press the gasket into place within the bell. Locate the gasket evenly around the entire joint. Move the ductile iron gland along the pipe into position for bolting. Insert all of the bolts and screw up the nuts tightly with the fingers. When a torque-limiting wrench is used, the torque for various sizes of bolt shall be as follows:

Bolting Diameter	Range of Torque
5/8 inch (15.9 mm)	40 to 60 foot-pounds (54.2 to 81.4 nm)
3/4 inch (19.1 mm)	60 to 90 foot-pounds (81.4 to 122 nm)
1 inch (25.4 mm)	70 to 100 foot-pounds (94.9 to 135.6 nm)
1-1/4 inch (31.8 mm)	90 to 120 foot-pounds (122.0 to 162.7 nm)

If a wrench other than a torque-limiting type is used, use the following wrenches:

Bolt Diameter	Length of Wrench
5/8 inch (15.9 mm)	8 inches (203 mm)
3/4 inch (19.1 mm)	10 inches (254 mm)
1 inch (25.4 mm)	12 inches (305 mm)
1-1/4 inch (31.8 mm)	14 inches (356 mm)

Tighten alternately nuts spaced 180 degrees apart in order to produce an equal pressure on all parts of the gland. Disassemble, clean, and re-assemble all leaking joints.

1101.063 Joining of Push-on Joint Pipe (Compression Joint); Ductile Iron.

Cleaning and Assembly. Thoroughly clean the inside of the bell and the outside of the spigot to remove all oil, grit, excess coatings, and other foreign matter. Flex the circular rubber gasket inward and insert into the gasket recess of the bell socket.

Apply a thin film of non-toxic vegetable-based gasket lubricant, meeting ANSI Standard 60/61 requirements, to the surface of the gasket and the spigot end of the pipe. Do not use mineral oil or petroleum based lubricants. Do not lay pipes in cold temperatures when gaskets and lubricants are not workable.

Enter the spigot end of the pipe into the socket with care to keep the joint from contacting the ground. Complete the joint by forcing the plain end of the pipe into the seat of the socket with a forked tool, jack-type tool, backhoe, or other approved method. Insert 12-inch (305-mm) diameter and smaller pipe with the use of a spade or a bar and sufficient manpower to seat the joint. When completing a joint utilizing a 12-inch (305 mm) restrained joint gasket, use a backhoe where needed. Exercise care to not damage the gasket in this operation.

Mark pipe with a depth mark before assembly to assure that the spigot end is inserted to the full depth of the joint.

File or ground field-cut pipe lengths to obtain a chamfer, on outside of pipe, 1/8 inch (3.2 mm) from cut edge and at an angle of 30 degrees with the cut edge. Remove all rough or sharp edges from the cut edge to prevent possible damage to the rubber gasket.

1101.064 Joining Steel Pipe.

Manufacture/Installation. Manufacturing and installation must be in strict accordance with the most current editions of AWWA Specification C200 and AWWA M11 (Steel Pipe Installation Manual).

1101.065 Joining Concrete Pipe.

Cleaning and Preparing the Joint. Wire brush the spigot ring and bell ring of each pipe joint. Thoroughly clean both rings and the rubber gasket to remove all oil, grit, excess mortar, and other foreign material. Use an approved vegetable base lubricant on each gasket, spigot ring, and bell ring immediately before making the joint. Generously lubricate the gasket groove of the spigot ring. No foreign matter of any kind shall be allowed to touch any area after it has been lubricated.

Methods of Making Joints. Select one of the methods listed below for the installation of pipe, with the approval of GCWW Inspector.

Pull-jack inside method. Place the anchoring post for the jack at least three lengths from the pipe being installed. Firmly wedge the anchor posts to resist the pull necessary to install the pipe, without marring or chipping the lining of the pipe.

Pull-jack outside method. Place the anchoring sling for the jack at least three lengths from pipe being installed or brace an extra heavy trench jack securely against the trench in place of the sling.

Backhoe method. Push "home" the pipe with a backhoe. Use oak blocking between the pipe spigot/bell and the backhoe. Any obstructions encountered in the installation of the pipe, due to the failure of having 50 feet (15.25 m) of ditch open ahead of laying operations, may require the removal and relaying of the pipe at the Contractor's expense.

Checking the Joint. Place a 5/8 inch (15.9 mm) thick metal joint stopper at the spring line, between the spigot ring and "home" of the pipe bell, at the time the pipe is inserted. Use a feeler gauge to check the rubber gasket alignment in the gasket groove. When the rubber gasket is properly aligned, remove the stopper, and insert the pipe to the full joint depth.

Completing the Joint. Use a mortar mix composed of one part masonry cement 701.07, two parts of fine aggregate 703.03, and Cincinnati hydrant water or equal. Mix to a grout consistency to complete the joint outside. Use a stiff consistency for the joint inside.

Firmly secure the "diaper", furnished by the pipe fabricator, around the outside of the joint. Pour the grout mixture down inside the "diaper" from alternate sides of the opening, until the "diaper" is full. Trowel the top of the joint with stiff mortar.

Finish the inside of the joint with the stiff mortar to achieve a smooth effect. Remove any excess mortar.

Allow the completed joint to "cure" in accordance with the Manufacturer's recommended procedures before using any heavy equipment directly over the joint. This includes compaction of backfill. Failure to do so may require the exposure of each joint to verify its integrity at the Contractor's expense.

Coating Mechanical Couplings and Closure Assemblies. Coat all exposed steel pipe, couplings, flanges, or bolts, either buried or in chambers, with Sherwin-Williams High Solids Catalyzed Epoxy Paint (two part mix NSF 61 approved). Apply all coating material in accordance with Manufacturer's recommendations.

For closure assemblies, use a casing of concrete (one part Portland cement and two parts sand). Pour the concrete to obtain a minimum thickness of three inches (76 mm) around the outside of the exposed assemblies. Prior to pouring of concrete, wrap the closure assemblies completely in polyethylene.

1101.066 Joining HDPE (High Density Polyethylene) Pipe. Assemble HDPE in accordance with the related GCWW Standard Drawings and the HDPE Water Main Specifications.

1101.07 Backfilling. Backfill all pipe trenches, tunnel shafts, test holes, and other excavations required to install the proposed water main work as shown on the Plans or as directed by the GCWW Inspector.

Conform to the GCWW Standard Drawings.

1101.071 Backfill Materials.

Backfill Gravel. Conform to 703.11 except that no foundry sand will be allowed.

Pea Gravel. May be unwashed with 100 percent of the material passing 1/2-inch (12.7 mm) sieve, a minimum of 25 percent passing a No. 10 sieve, and a maximum of ten percent passing a No. 100 sieve. Do not include any slag, cinders, ashes, refuse, or other objectionable material.

Coarse Fill. Excavated material from the trench but must be reasonably free from rubbish, muck, shale, topsoil, or other unsuitable material. Maximum dimension of rock shall not exceed three inches (76 mm).

Granular Material. Conform to 703.11 except that no slag, slaker aggregate, or broken salvaged road metal will be allowed.

Methods for Backfilling.

Controlled Density Fill (CDF)/Controlled Low Strength Mortar (CLSM) (HAMCIN: CLSM-CDF) is an acceptable backfill material. Meet the requirements of Item 613. Prior to placement of CDF/CLSM, place a compacted bedding of granular material 12 inches (305 mm)

above all utilities within the excavation. In addition to Item 613 or HAMCIN: CLSM-CDF, whichever is applicable, the approved mixes must meet GCWW material specifications.

Method A Backfill. Conform to the GCWW Standard Drawings. After the embedment material has been placed, place the balance of the backfill material in six-inch (152 mm) compacted layers by a satisfactory mechanical means. Unless specifically noted on the Plans, all backfill shall conform to Method A.

Method B Backfill. Conform to the GCWW Standard Drawings. After the embedment material has been placed, place the balance of the backfill material in six-inch (152 mm) compacted layers by a satisfactory mechanical means. Method B will only be permitted when shown on Plans or specified in the Contract Proposal.

In lieu of mechanical compaction, the Contractor may request in writing to the GCWW to utilize jetting/flooding of the backfill material. If the permitting agency grants approval and it is determined by the GCWW that satisfactory drainage can be provided for, jet the backfill material with water to saturation. Following jetting, remove all free water from the trench by pumping or any other effective means. Perform all jetting in lifts in strict compliance with Item 603.09.

Special Backfill. When other than standard backfilling is required, it will be so indicated on the Plans or noted in the Proposal.

1101.072 Restoration. Perform all temporary and permanent restoration as indicated on the Contract plans and/or in compliance with the requirements of the City of Cincinnati, Hamilton County, or appropriate political jurisdiction.

Roll all surface asphalt, temporary and /or permanent, into place. Do not tamp mechanically or use any other means.

Seeding performed within all drainage areas shall conform to Item 659, 712.11, and appropriate ODOT specifications. Use a reinforced woven fabric.

Replace all traffic control lines and devices disturbed by construction. Meet the requirements of the City of Cincinnati, Hamilton County, or appropriate political jurisdiction for traffic control.

1101.08 Method of Measurement. GCWW will measure the length of the accepted water main installed which includes the actual number of lineal feet (meters) of pipe, specials, and fittings measured along the center line of the water main in place.

1101.09 Basis of Payment. Payment is full compensation for all labor, material, equipment, and related testing, required to lay the pipe and fittings, and perform restoration as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1101	Lineal Feet (meters)	Laying ____" (cm) (type of pipe) and Fittings

1101	Lineal Feet (meters)	Furnishing and Laying ____" (cm) (type of pipe) and Fittings
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Item 1102 Hauling Water Works Materials

1102.01	Description
1102.02	Measurement
1102.03	Basis of Payment

1102.01 Description. The work covers the loading and hauling all material furnished by the Greater Cincinnati Water Works, from a GCWW Distribution Storage Yard, or other designated location, to the project site.

Load and store all material according to 1101.03.

1102.02 Measurement. GCWW will measure the total tonnage of all material hauled from a GCWW Distribution Storage Yard to the job site, and the total tonnage of all surplus material furnished by the GCWW returned to the GCWW Distribution Storage Yard.

The pipe manufacturer will deliver concrete pipe and fittings to the job site. Return excess concrete pipe and fittings to the GCWW Distribution Storage yard.

The hauling of material furnished by the GCWW for service branches, will be paid for under Item 1126.

Any additional movement of any pipe or material within the confines of the project is the responsibility of the Contractor. Include the cost of any such work in the price bid per lineal foot (meter) of laying pipe, Item 1101.

1102.03 Basis of Payment. GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1102	Tons (tonnes)	Hauling Water Works Material

Item 1103 Lowering Existing Water Mains

1103.01	Description
1103.02	Materials
1103.031	General
1103.032	Lead Joints
1103.033	Mechanical Joints
1103.034	Sulfur-Based Jointing Compound
1103.035	Mechanical Coupling
1103.04	Measurement

1103.05 Basis of Payment

1103.01 Description. The work covers the lowering of existing water main, fittings, and fire hydrants where shown on the Plans or as directed by the GCWW Inspector. Perform this operation while the water main is under pressure, and maintain water supply for domestic consumption and fire fighting purposes. Restore the disturbed area as required.

1103.02 Materials. Furnish all material required to lower existing water main, and to make joints watertight.

1103.031 General. Dig test holes at those locations indicated by the GCWW Inspector to determine the elevation of the existing water main. If the elevation of the existing water main warrants lowering, excavate the trench under the water main and lower the water main so that the top of the pipe will be 3-1/2 feet (1.07 m) below the surface of proposed finished grade.

Where water main is encased in polyethylene, remove the existing encasement. Install new polyethylene encasement in accordance with Standard Drawing 105-5.

If the elevation of the existing water main indicates lowering is not necessary, the Contractor will be compensated for the test holes under Item 1120.

In the event other underground structures interfere with the lowering process, cut or disconnect the water main, and re-lay below such structures.

Perform lowering gradually and in a careful manner. The Contractor will be held responsible for any cracking, breakage, or damage to the pipe and appurtenances.

After the pipe has been lowered, the GCWW Inspector will check all joints, and determine if they are watertight. Backfill and restore the trench area. Comply with the requirements of the City of Cincinnati, Hamilton County, or appropriate political subdivision for all temporary and permanent restoration.

1103.032 Lead Joints. Re-caulk or repour all poured lead joints as necessary to make the joint watertight.

1103.033 Mechanical Joints. Remove and replace all mechanical joint bolts and nuts. When necessary to provide water tightness, cut the pipe install a new rubber gasket.

1103.034 Sulfur Based Jointing Compound. If a joint leak occurs in sulfur based jointing compound joints, remove and replace with new pipe and mechanical sleeves.

1103.035 Mechanical Coupling. Remove and replace all bolt and nuts.

1103.04 Measurement. GCWW will measure the actual number of lineal feet (meters) of pipe and fittings measured along the centerline of the lowered water main in place, completed, and accepted.

The price per lineal foot (meter) of water main lowered will include the resetting of fire

hydrants.

1103.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment to lower the water main, fittings, fire hydrants, and perform restoration, as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1103	Lineal Foot (meter)	Lowering Existing ____" (cm) Water Main

Item 1104 Installing Valves on Existing Water Mains

1104.01	Description
1104.02	Materials
1104.03	Construction
1104.04	Measurement
1104.05	Basis of Payment

1104.01 Description. This item covers the installing of valves on existing water mains.

1104.02 Materials. GCWW must inspect all valves, pipe and fittings.

1104.03 Construction. Make any necessary excavation, cut and remove a piece of existing pipe, and install a valve, necessary pipe, and fittings conforming to Item 1101. Install polyethylene. Backfill all excavations as described in 1101.07 and restore all disturbed surfaces.

1104.04 Measurement. GCWW will measure the Installation of Valves on Existing Lines by the number of each size completed and accepted.

1104.05 Basis of Payment. Payment is full compensation for all labor, material and equipment required to install the valve on the existing water main as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1104	Each	Installing ____" (cm) Valve on Existing Water Main
1104	Each	Furnishing & Installing ____" (cm) Valve on Existing Water Main

Item 1105 Plugging Existing Water Mains and Fittings

1105.01	Description
1105.02	Construction
1105.03	Measurement
1105.04	Basis of Payment

1105.01 Description. This work covers plugging existing water mains and specials at the point indicated on the Plans, or as otherwise required, placing concrete blocking, and backfilling and restoring all disturbed surfaces.

A. Plugging work not covered by this item:

1. Any plugs required for testing or sterilization purposes.
2. Any plugs made for the convenience of the Contractor.
3. Any permanent plugs placed in water mains or specials in the installation of new water mains.
4. Any temporary plugging necessary to provide water for consumers or fire protection, unless specifically indicated on the Plans as a pay item.

1105.02 Construction. Make the necessary excavation and carefully remove the old pipe, install the plug, and make the required joint.

Firmly secure the plug with a mechanical clamp and/or block with concrete Class "C" as directed by the GCWW Inspector.

Backfill the excavation as described on the GCWW Standard Drawing and restore all disturbed surfaces. Seal open ends of water mains abandoned, because of the installation of plugs, with a brick or concrete bulkhead.

1105.03 Measurement. GCWW will measure Plugs in Existing Water Mains and Fittings by the number of each size completed and accepted.

1105.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment necessary to complete the work as herein specified.

Concrete used for blocking will be paid for under Item 1110.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1105	Each	Furnishing and Installing ____" (cm) Plugs in Existing Water Mains and Fittings

Item 1106 Furnishing and Installing Foamglas Pipe Insulation

- 1106.01 Description**
1106.02 Measurement
1106.03 Basis of Payment

1106.01 Description. This item covers the furnishing of all labor and material necessary to install FoamGlas preformed pipe insulation wrapped with a double layer of polyvinyl tape on water mains.

Water Main Size	Insulation Thickness
4 inches to 8 inches (102 mm to 203 mm)	2-1/2 inches (63.5 mm)
10 inches to 16 inches (254 mm to 406 mm)	3-1/2 inches (89 mm)

1106.02 Measurement. GCWW will measure the actual number of linear feet (meters) of pipe insulation along the centerline of the pipe insulation in place, completed and accepted.

1106.03 Basis of Payment. Payment is full compensation for all labor, material, and equipment required for the installation of the 2-1/2 inch (63.5 mm) or 3-1/2 inch (89 mm) thick pipe insulation.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1106	Linear Foot (meter)	Furnishing and Installing ____" (cm) Foamglas Pipe Insulation

Item 1107 Furnishing and Installing Tunnel Liner

- 1107.01 Description**
1107.02 Materials
1107.03 Construction
1107.04 Measurement
1107.05 Basis of Payment

1107.01 Description. This work consists of furnishing and installing a tunnel liner of the size indicated, to permit the laying of water mains as shown on the Plans or as directed by the GCWW Inspector.

1107.02 Materials.

Tunnel Liner -City of Cincinnati Department
of Purchasing Spec. 5-3
or latest revision thereof.

Cement for grout	701.04
Sand for grout	703.03
Concrete, Class "C"	1110.021
Pea Gravel.....	1101.071
Brick	704.02

1107.03 Construction. Make any excavation, mining and boring necessary to install the tunnel liner. Provide a shaft of adequate size to facilitate the work at the beginning of the tunnel installation. Install sheeting and timbers as required to fully protect the structure and the workers, and to prevent settlement of pavement curbs, walks, buildings, or other structures.

Light and ventilate the tunnel to allow proper construction and inspection. The Engineer will provide control points inside the tunnel as work progresses. Use the control points and install the liner to the line and grade as shown on the Plans or as directed by the GCWW Inspector. Protect and safeguard such control points from damage or movement.

A maximum deviation of six inches (152 mm) from true line and grade will be allowed. Correct any deviation greater than six inches (152 mm) by re-mining, so that the pipe may be laid to true line and grade in the tunnel.

Install one panel, containing a grout hole, in each ring or course. Space the panels 90 degrees apart, circumferentially, in each succeeding ring or course. Perform grouting to back up the liner plates and fill all voids as directed by the GCWW Inspector.

Install a concrete base or floor as wide as the O.D. of the pipe for the full length of the tunnel to provide a firm footing for supporting the water main. Submit the method for loading the pipe into the tunnel to GCWW for approval.

After the water main is laid in the tunnel, backfill the area between the outside of the water main and the tunnel liner plates with pea gravel.

Close both ends of the completed tunnel with four-inch (102 mm) brick bulkheads.

When directed by the GCWW Inspector, install a four-inch (102 mm) drain in the bulkhead.

Perform all restoration as specified.

1107.04 Measurement. GCWW will measure the actual number of linear feet (meters) of installed tunnel liner as measured along the center line of the water main.

1107.05 Basis of Payment. Payment is full compensation for labor, material, and equipment necessary to install the tunnel liner as herein specified.

GCWW will make compensation for the installation of the water main with in the tunnel liner under the appropriate Item 1101.

When the GCWW Inspector orders sheeting and bracing to remain in tunnel shafts or pipe trenches, compensation will be made under Item 637.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1107	Lineal Foot (meter)	Furnishing and Installing ____" (cm) Tunnel Liner

Item 1108 Furnishing and Installing Steel Casing

1108.01	Description
1108.02	Materials
1108.03	Construction
1108.04	Measurement
1108.05	Basis of Payment

1108.01 Description. This work covers furnishing and installing a casing of the diameter and wall thickness indicated and furnishing and installing approved casing insulators, to permit the installation of a water main as shown on the Plans or as directed by the GCWW Inspector.

1108.02 Materials.

Steel	ASTM A-139 Grade B
Type of Jointing	Welded
Brick	704.02
Concrete, Class "C"	1110.021
Coating	Bituminous or Approved Equal

1108.03 Construction. Make all necessary excavations to complete the boring or jacking operation to install the steel casing. Submit the method of boring or jacking operation to the GCWW for approval. The Engineer will provide control points for the casing installation. Install casing to conform to these control points. If there is any deviation in grade or alignment of the casing, which prevents the installation as designed or access for maintenance, re-install the casing in the proper manner.

Furnish and install approved water main casing insulators as specified in the GCWW Standard Drawings.

After the water main is installed, completely fill all voids between the outside of the pipe and the casing with pea gravel.

Close both ends of the casing with a four-inch (102 mm) brick or concrete bulkhead.

When directed by the GCWW Inspector, install a four-inch (102 mm) drain in the bulkhead.

The Contractor is responsible for the bore pit excavations and the necessary support and maintenance of all utilities within the excavations.

Perform all restoration as specified.

1108.04 Measurement. GCWW will measure the actual number of linear feet (meters) of installed tunnel liner as measured along the center line of the water main.

1108.05 Basis of Payment. Payment is full compensation for labor, material, and equipment necessary to install the casing as herein specified.

GCWW will make compensation for the installation of the water main within the steel casing under the appropriate Item 1101.

When the GCWW Inspector orders sheeting and bracing to remain in casing shafts or pipe trenches, compensation will be made under Item 637.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1108	Linear Foot (meter)	Furnishing and Installing ____" Steel Casing

Item 1109 Excavating For Tapping Sleeve and Valve

1109.01	Description
1109.02	Construction
1109.03	Measurement
1109.04	Basis of Payment

1109.01 Description. This work covers the excavation of a pit in accordance with the dimensions shown on GCWW Standard Drawings, backfilling, compaction, and restoration.

1109.02 Construction. Make the excavation in accordance with the GCWW Standard Drawings and conform to the pertinent references in 1101.04.

GCWW will install the tapping sleeve and valve and tap the water main.

Construction of the chamber, if required, will be compensated for under Item 1111. If a valve box is installed, it will be paid for under Item 1116.

Properly backfill the excavation and perform the necessary restoration.

1109.03 Measurement. GCWW will measure Excavating for Tapping Sleeves and Valves by the number of each excavation completed and accepted.

1109.04 Basis of Payment. GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1109	Each	Excavating for ____" (cm) x ____" (cm) Tapping Sleeve and Valve

Item 1110 Concrete

1110.01	Description
1110.02	Materials
1110.03	Construction
1110.04	Measurement
1110.05	Basis of Payment

1110.01 Description. This item covers furnishing and placing the various classes of concrete listed in 1110.02, in the necessary formwork, in accordance with these specifications, as shown on the Plans or as directed by the GCWW Inspector.

1110.02 Materials. Materials shall be as follows:

Concrete Class "C" – 499.

High-Early Concrete Class "C" – 499. except Portland Cement shall conform to 701.02 and 701.05.

Concrete Class "T" – one part Portland Cement (701.04), four parts of sand (703.02); eight parts of gravel (703.02); and 4.75 gallons (18.0 litres) of water per sack of cement.

1110.03 Construction. Construction shall be as follows:

Structures. Use Concrete Class "C" - 1110.021 or 1110.022 for all concrete to be used in constructing piers, pipe protections, blocking, remodeling chambers and for any other purpose necessary for satisfactory completion of the work. All concrete construction shall be governed by the detailed drawings, GCWW Standard Drawings, or as directed by the GCWW Inspector.

Blocking of pipe specials requires the placing of concrete between the water main and the limits of the trench, in a manner to assure the proper distribution of forces to undisturbed earth where possible.

The provisions of Item 511 apply to this item with the following exceptions: 511.17, 511.18, 511.19, 511.20, 511.21, 511.22, 511.23, 511.24, and 511.25.

Backfill Concrete. Use Concrete, Class "T", for backfill in areas designated on the Plans or where directed by the GCWW Inspector.

High-Early Concrete. Use High-Early Concrete as a substitute for Concrete, Class "C" 1110.031 only when conditions warrant and with the permission of GCWW Inspector. Adhere to

all provisions of 1110.031

1110.04 Measurement. GCWW will measure concrete by the number of cubic yards (cubic meters), as determined by calculation from structure dimensions (or backfill dimensions), in place, completed and accepted.

Calculation of concrete used in blocking will only be considered for a distance of 12 inches (305 mm) from the outside of the pipe on the thrust side of pipe special, unless otherwise shown on the Plans or Standard Drawings.

1110.05 Basis of Payment. Payment is full compensation for all labor, material, formwork, and equipment required to complete the work as herein specified.

Compensation for concrete used in the construction of Water Works Chambers is included in Item 1111.

Compensation for reinforcing steel is included in Item 509.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1110	Cubic Yards (m ³)	Concrete, Class "C"
1110	Cubic Yards (m ³)	Concrete, Class "C" High-Early Strength
1110	Cubic Yards (m ³)	Concrete, Class "T"

Item 1111 Water Works Chambers

1110.01	Description
1110.02	Materials
1110.03	Construction
1111.031	Brick Masonry Construction
1111.032	Poured Concrete Walls, Slabs and Floors
1111.033	Precast Chambers
1111.04	Measurement
1111.05	Basis of Payment

1111.01 Description. This item covers the labor, material, and equipment required to excavate and construct brick masonry, poured concrete, and precast Water Works Chambers.

1111.02 Materials. Furnish materials conforming to:

Concrete	1110.021
Concrete Bricks	704.02
Masonry Cement	701.07

Fine Aggregate.....	703.03
Manhole Steps.....	City of Cincinnati Department of Purchasing Spec. No. 11-14 (latest revision)
Castings and Covers	Furnished by Contractor (must meet City of Cincinnati Department of Purchasing Spec No. 11-34 – latest revision)

1111.03 Construction. Construct new chambers in accordance with the GCWW Standard Drawings or as detailed in the Plans.

Make all excavations necessary to construct chambers. After the excavation has been made, and the sides securely supported where necessary, carefully hand-trim and shape the bottom of the excavation to conform to the outside of the proposed structure. Place a suitable concrete floor, as shown on GCWW Standard Drawings or detailed plans, to form a foundation for the chamber.

1111.031 Brick Masonry Construction. Remove all mud and water from the foundation before laying brick. Use only brick that is clean and entirely free from dirt, paint, grease, and all other foreign substance.

Spread a layer of mortar, one-half inch (13 mm) thick, upon the prepared foundation. Set clean wet brick on the mortar. Use GCWW hydrant water for mixing mortar and wetting bricks.

Construct brick walls to a thickness called for on the Plans or GCWW Standard Drawings. Thoroughly wet bricks before laying in mortar. Lay up the bricks with full mortar joints. Use a mortar mix composed of one part of Portland Cement 701.07, and two parts of sand 703.03 by volume. Mix the materials dry until the color is uniform; then add water and continue mixing until a stiff homogeneous mass is produced. Thoroughly mix all mortar in suitable watertight boxes or in approved mechanical mixers. Mix mortar in small quantities so that each batch may be used before it has taken its initial set. The use of lime in the mortar and the use of re-tempered mortar is not permitted. Re-tempered mortar is that which has been remixed with or without the addition of water after the initial set has taken place. Lay each successive course of brick in a full bed of mortar. Lay all bricks truly horizontal except in structures that are built to a fixed grade.

In general, lay bricks with push joints. Entirely fill the joints with mortar. The interior joints should not be more than 1/4 inches (6.4 mm) wide. Lay all brick with broken joints both on the sides and with the course below, and the masonry shall be thoroughly bonded together. Use whole bricks only. Use bats only to fill interstices and to effect closures. When required, anchor manhole steps in the masonry as the wall is laid up, in the manner shown on the Standard Drawings. Neatly point up the interior joints and clean the surface of all surplus mortar. Entirely fill the outside joints with mortar.

Backfill around the brick wall as quickly as possible following the completion of the brickwork.

1111.032 Poured Concrete Walls, Slabs, and Floors. Construct poured concrete walls, slabs, and floors as shown on the approved plans or the GCWW Standard Drawings. Conform to 1110.021 for Concrete Class "C".

Batching and Mixing. Unless otherwise approved by the GCWW Director, use an acceptable ready-mixed concrete supplier.

Consistency. Use concrete with a consistency suitable for the placement conditions with aggregates floating uniformly throughout the mass. The concrete must flow sluggishly when vibrated or spaded. Maintain a uniform slump.

Delivery Tickets. Provide a delivery ticket for each load of ready-mixed concrete. Coordinate with the truck operator to provide a copy of each ticket to the GCWW Inspector at the time of delivery.

Placement. Handling, depositing, and compacting concrete is subject to adjustment by the GCWW Inspector depending on weather and placement conditions.

With the approval of the GCWW Inspector, predetermine the limits of each concrete pour. Deposit all concrete within such limits in one continuous operation.

Before placing concrete, rigidly secure the forms, reinforcements, water stops, anchor bolts and embedments in proper position. Remove all dirt, mud, water, and debris from the space to be occupied by the concrete. Clean all surfaces encrusted with dried mortar or concrete from previous placement operations.

Conveyance and Distribution. Convey concrete to the point of final deposit by methods that will prevent segregation or loss of ingredients. Deposit concrete in final position without moving laterally in the forms more than 5 feet (1.5 meters).

Depositing Concrete. Deposit concrete in horizontal layers of proper depth for effective compaction. Do not exceed 24 inches (610 mm) on any layer. Each layer of concrete shall be plastic when covered with the following layer. Fill forms at a rate of vertical rise of not less than 2 feet (610 mm) per hour.

Deposit and compact concrete in wall forms before placing reinforcing. Do not exceed 6 feet (1.8 meters) of vertical height on the portion of any wall placed monolithically with a floor or roof slab. Allow concrete in walls to settle at least two hours before placing concrete in the structural system to be supported by such walls.

Thoroughly settle concrete when top finished. Remove all laitance, debris, and surplus from concrete surfaces at tops of forms by screeding, scraping, or other effective means.

Compaction. During and immediately after depositing, thoroughly compact all concrete and work concrete around all reinforcements and embedment and into the corners of the forms.

Compact all concrete with mechanical vibrators that will maintain at least 9000 cycles per minute when immersed in the concrete and are driven by not smaller than a 1-1/2 hp (1.1186

kW) motor. The number and type of vibrators are subject to the approval of the Director.

Tests of Concrete. If required by the GCWW Director for test purposes, make, care for, and store cylinders or other shapes of concrete for test purposes. Furnish all materials and forms. The GCWW will make all tests on such concrete specimens at no cost to the Contractor, unless otherwise specified on the Contract Plans.

Provide the services of a helper whenever assistance is required in making other specified tests.

Reinforcement. Accurately form reinforcements and remove loose rust, scale, or other matter that reduces bond. Conform to Item 509 "Reinforcing Steel."

Placement. Position reinforcement on supports, spacers, hangers or other reinforcements and secure in place with wire ties or suitable clips.

Forms. Use forms designed to produce hardened concrete having the shape, lines, and dimensions shown on the plans. Construct and maintain forms in proper position and accurate alignment.

Where concrete is placed against rock, remove all loose pieces of rock and clean exposed surfaces with a high-pressure hose.

Design. Forms shall be substantial and sufficiently tight to prevent leakage of mortar. Brace or tie forms to maintain the desired position, shape, and alignment during and after placing concrete. Size and space walers, studs, internal ties, and other form supports without exceeding proper working stresses.

Form Ties. Use GCWW approved removable end, permanently embedded body type form ties with a sufficient strength and rigidity to support and maintain the form in proper position and alignment without the use of auxiliary spreaders. Outer ends of the permanently embedded portion shall be at least one inch (25 mm) back from the concrete face. Construct permanently embedded portions of form ties, not provided with threaded ends, so that the removable ends are readily broken without damage to the concrete or concrete surface.

Form Removal. Do not remove or disturb forms until the concrete has attained sufficient strength to safely support all dead and live loads. Maintain shoring beneath beams or slabs and reinforce, as necessary, to carry any construction equipment or materials placed thereon. Avoid surface gouging, corner or edge breakage, and other damage to the concrete when removing forms.

Finishing Formed Surfaces. Fill recesses from form ties flush with mortar. Remove fins and other surface projections from all formed surfaces except exterior surfaces in contact with earth backfill. If necessary, use a power grinder.

Finishing Unformed Surfaces. Surface treatment is not required for buried or permanently submerged concrete except that required to obtain the surface elevations or contours and surfaces free of laitance. Screed the unformed surfaces of all other concrete.

Provide an initial float finish followed by additional floating.

Screeding. When screeding, provide a concrete surface conforming to the proper elevation and contour, with all aggregates completely embedded in mortar. Eliminate irregularities on all screeded surfaces.

Floating. Give screeded surfaces an initial float finish as soon as the concrete has stiffened sufficiently for proper working. Remove any piece of coarse aggregate that is disturbed by the float or causes a surface irregularity and replace with mortar. Initial floating shall produce a surface of uniform texture and appearance with no unnecessary working of the surface.

Curing. Protect the concrete from loss of moisture for at least seven days after placement, unless otherwise approved by the GCWW Director.

Keep the concrete surfaces adequately wet during the specified curing period.

Backfill. After removal of all formwork and proper curing of the concrete, backfill around the completed chamber with backfill gravel.

1111.033 Precast Chambers. Furnish and install Precast Reinforced Concrete Chambers in accordance with Item 706.13. Conform to all pertinent provisions of this item and applicable GCWW Standard Drawings. Use precast chambers in all locations where space permits and as directed by GCWW. Chambers require material certification prior to installation. Manufacturers of precast chambers must be approved by GCWW.

1111.04 Measurement. GCWW will measure Valve Chambers by the number of each size and type, completed and accepted.

1111.05 Basis of Payment. Payment is full compensation for work done under this item for all labor, material, and equipment required to build or set the chamber, and to perform restoration, as herein specified.

In the event that the height of any chamber exceeds the depth shown on the GCWW Plans, GCWW will compensate the Contractor under Item 602 for the additional depth of brick and Item 1110 for poured concrete chambers.

If no profile or note is shown on the plans specifying the depth of chambers, then the depths shown in the GCWW Standard Drawings shall prevail, and additional depths paid as indicated above.

GCWW will compensate for reinforcing steel ordered by the GCWW Inspector, in addition to that specified on the GCWW Standard Drawings or details on the Plan, under 509 "Reinforcing Steel."

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1111	Each	___" (cm) x ___" (cm) Tapping Valve Chamber
1111	Each	___" (cm) Valve Chamber
1111	Each	___" (cm) Laydown Valve Chamber
1111	Each	___" (cm) Manhead Chamber
1111	Each	___" (cm) Aircock Chamber on ___" (cm) Water Main
1111	Each	___" (cm) x ___" (cm) Flanged Outlet Valve Chamber
1111	Each	___" (cm) Butterfly Valve Chamber

Item 1112 Hauling and Installing Fire Hydrants

1112.01	Description
1112.02	Furnishing of Fire Hydrants
1112.03	Installation of Fire Hydrants
1112.04	Measurement
1112.05	Basis of Payment

1112.01 Description. This item covers the hauling and installing of new fire hydrants where indicated on the Plans, or as directed by the GCWW Inspector.

1112.02 Furnishing of Fire Hydrants. Furnish fire hydrants as specified in City of Cincinnati Department of Purchasing Specification 10-107, or latest revision thereof.

Where specifically noted on the Plans, GCWW will furnish fire hydrants. Obtain these new fire hydrants at the GCWW yard at 4747 Spring Grove Avenue.

1112.03 Installation of Fire Hydrant. Haul the new hydrants from the source of supply and store them at the job site. Make the proper excavation and connect the new hydrant to the pipe as shown on the GCWW Standard Drawings or as directed by the GCWW Inspector.

Firmly set the hydrant on two 6 inch x 12 inch x 2 inch (152 mm x 305 mm x 51 mm) oak blocks. Install concrete blocking within the area between the back of the hydrant shoe and the undisturbed earth as shown on the GCWW Standard Drawings and as directed by the GCWW Inspector. Set the hydrant vertical, rotate the fire hydrant shoe when necessary, and properly orient the nozzles to the curb line.

Concrete used for blocking will be paid for under Item 1110.

The trench shall be backfilled with the proper material as designated in 1101.07.

When required, install guard posts and/or drainpipe to protect the fire hydrant. See GCWW Standard Drawing 103-1 and 103-1A.

Perform all restoration as specified on the Contract Plans or as required by the agency of jurisdiction.

1112.04 Measurement. GCWW will measure Installing Fire Hydrants or Flush Hydrants by the number of each completed and accepted.

1112.05 Basis of Payment. Payment is full compensation for work done under this item for all labor, material, and equipment required to install the hydrants as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1112	Each	Hauling & Installing Fire Hydrants
1112	Each	Furnishing & Installing Fire Hydrants
1112	Each	Furnishing and Installing Flush Hydrants (various sizes)

Item 1113 Relocating Existing Fire Hydrants

1113.01	Description
1113.02	Construction
1113.03	Measurement
1113.04	Basis of Payment

1113.01 Description. This item covers furnishing of all labor, tools, material, and equipment necessary to relocate an existing fire hydrant to a new location as shown on the Plans or as directed by the GCWW Inspector.

1113.02 Construction. Excavate and carefully disconnect the fire hydrant from the existing pipe. Wire brush and thoroughly clean the joint. Remove existing pipe and plug the existing tee, if necessary. Install all new pipe and fittings required to set the hydrant to the proper grade and alignment.

Conform to the pertinent provisions of 1112.03.

Compensation for all new pipe and fittings installed will be under Item 1101.

Compensation for plugging existing tees and mains will be under Item 1105.

Perform all restoration as specified on the Contract Plans or as required by the agency of

jurisdiction.

1113.03 Measurement. GCWW will measure Relocating Existing Fire Hydrants by the number of each completed and accepted.

1113.04 Basis of Payment. Payment is full compensation for all labor, tools, material, and equipment necessary to relocate fire hydrants as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1113	Each	Relocating Existing Fire Hydrants

Item 1114 Removing Fire Hydrants

1114.01	Description
1114.02	Construction
1114.03	Measurement
1114.04	Basis of Payment

1114.01 Description. This item covers the removing of fire hydrants when they are not to be relocated.

1114.02 Construction. Make the necessary excavation, cut out the old pipe, carefully remove the complete hydrant intact, (shoe to operating nut), bulkhead seal existing fire hydrant lead. Completely backfill the opening, restore all disturbed surfaces, and return the hydrant to the governing agency.

All new pipe and fittings will be paid for under Item 1101. Plugging of existing tees or mains will be compensated for under Item 1105.

If the fire hydrant is to be abandoned and eliminated by paving or grading operations, no payment will be made.

Perform all restoration as specified on the Contract Plans or as required by the agency of jurisdiction.

1114.03 Measurement. GCWW will measure Removing Fire Hydrants by the number of each completed and accepted.

1114.04 Basis of Payment. Payment is full compensation for all labor, tools, material, and equipment necessary to remove fire hydrants as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1114	Each	Removing Fire Hydrants

Item 1115 Furnishing and Installing Fire Hydrant Extensions

1115.01	Description
1115.02	Materials
1115.03	Measurement
1115.04	Basis of Payment

1115.01 Description. This item covers the furnishing of all labor, tools, material, and equipment necessary to furnish and install fire hydrant extensions of the length required. This work includes drilling the stem, installing the pin, and reassembly of the hydrant where required, or as directed by the GCWW Inspector.

Perform all restoration as specified on the Contract Plans or as required by the agency of jurisdiction.

Install no more than one fire hydrant extension on any hydrant setting. Limit length of fire hydrant extension to 2 feet or less. Raise hydrants requiring more than 2 feet of extension by use of S-bends or 2 mechanical joint bends of the appropriate degree.

1115.02 Materials. Furnish fire hydrant extensions, consisting of spool and stem extensions, conforming to the specifications of the GCWW (see Drawing No. 438M) and of the necessary length to adjust the hydrant to the proper elevation.

1115.03 Measurement. GCWW will measure Fire Hydrants Extensions by the number of each size and length completed and accepted.

1115.04 Basis of Payment. Payment is full compensation for all labor, tools, material, and equipment necessary to install fire hydrant extensions as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1115	Each	Furnishing and Installing Fire Hydrant Extensions ____" (cm) Long

Item 1116 Installing Valve Boxes Complete

1116.01	Description
1116.02	Construction
1116.03	Measurement
1116.04	Basis of Payment

1116.01 Description. This item covers the installation of valve box hoods, lids, and telescopes, where shown on the Plans or directed by the GCWW Inspector.

1116.02 Construction. Make the necessary excavation and install the telescopes in a vertical position directly over the valve stem.

Backfill the excavation to the proper elevation so that the valve box hood can be set to the proper grade.

Set the valve box hood on a wood block or brick foundation to prevent the transferring of any loads from the hood to the valve.

Install only 3-piece iron style valve boxes in grass or pavement. At GCWW's discretion, install plastic valve boxes in sidewalk installations only.

Incorporate the installation of a "frost plug" device into all valve boxes.

1116.03 Measurement. GCWW will measure Valve Boxes Complete by the number completed and accepted.

1116.04 Basis of Payment. Payment is full compensation for all labor, tools, material, and equipment necessary to install valve boxes as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1116	Each	Installing Valve Boxes Complete
1116	Each	Furnishing and Installing Valve Boxes Complete
1116	Each	Furnishing and Installing Valve Boxes with ___" Air Release Complete, See Detail on Plans

Item 1117 Field Welding Tied Joints, Concrete Pipe

1117.01	Description
1117.02	Materials
1117.03	Construction
1117.04	Measurement
1117.05	Basis of Payment

1117.01 Description. This item covers field welding those joints of reinforced concrete pressure pipe required to be tied on the laying schedule or on the Plans.

1117.02 Materials. Furnish all material necessary to complete the operation, including filler rods.

1117.03 Construction. Delegate a certified welder to join the tied pipe in the manner indicated on the GCWW Standard Drawings.

Properly place filler rods and perform tack welding in the gap between spigot and bell rings.

Filling welds, 1/4 inch (6.4 mm), shall be of a quality and penetration to develop the full strength of the bell ring. Make welds 360 degrees in series of six inch (152 mm) long intermittent welds to avoid overheating gasket.

1117.04 Measurement. GCWW will measure Field Welding Tied Joints by the number completed and accepted per size of pipe diameter.

1117.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment necessary to complete the operation as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1117	Each	Field Welding Tied Joints ____" (cm) Diameter

Item 1118 Salvaging Existing Water Mains and Fittings

1118.01	Description
1118.02	Salvaging Procedures
1118.021	Concrete Pipe and Fittings
1118.022	Steel Pipe and Fittings
1118.023	Ductile Iron Pipe and Fittings
1118.03	Measurement
1118.04	Basis of Payment

1118.01 Description. This item covers salvaging existing pipe and fittings where shown on the Plans, or as directed by the Director, and the cleaning, repairing, and storing of such on the project.

1118.02 Salvaging Procedures. Make the excavation, disconnect the pipe and fittings, remove the pipe and fittings from the trench, and renovate in the appropriate manner listed below:

1118.021 Concrete Pipe and Fittings.

1. Remove grout from joint.
2. Flame wash tied pipe and specials to separate bell ring from the filler rod. Grind bell ring

smooth and round all sharp edges to 1/16 inch (1.6 mm) radius.

3. Disconnect pipe joint and carefully remove pipe and specials from the trench.
4. Patch any damage to lining or coating with a proper cement mixture to match original material.
5. Flush the concrete pipe and specials with a hose and wire brush to the satisfaction of the GCWW Inspector.

1118.022 Steel Pipe and Fittings.

1. Disconnect the couplings and carefully remove the pipe and fittings from the trench.
2. Flush inside and outside with a hose.
3. Patch any damage to coating or lining with same type of material as was used in original fabrication.

1118.023 Ductile Iron Pipe and Fittings.

1. Disconnect joints in pipe and fittings and carefully remove pipe.
2. Thoroughly flush with a hose and wire brush both inside and outside.
3. Patch any cracks in cement lining in a suitable manner.
4. Paint outer surface of pipe and fittings with an approved paint as ordered by the GCWW Inspector.

Properly backfill and thoroughly compact all trenches and restore all disturbed surfaces.

After the material has been cleaned to the satisfaction of the GCWW Inspector, store it at another location within the limits of the project, so that it may be re-laid, or hauled to a GCWW Distribution Storage Yard.

If the pipe is re-laid on the project, the Contractor will be compensated for the work associated with salvaging under Item 1101.

If the material is returned to the GCWW Distribution Storage Yard, the Contractor will be compensated under Item 1102.

1118.03 Measurement. GCWW will measure the actual laying length of salvaged water mains and fittings along the centerline of the water pipe.

1118.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to salvage pipe and fittings as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1118	Lineal Foot (meter)	Salvaging Existing ____" (cm) Water Mains and Fittings

Item 1119 Additional Excavation

1119.01	Description
1119.02	Construction Requirements
1119.03	Method of Measurement
1119.04	Basis of Payment

1119.01 Description. Additional excavation consists of excavation necessitated by a change in specified profile grade or unused trench because of changes in alignment ordered by the GCWW Inspector. Include compensation for additional excavation required to remove unsuitable soil under this item.

Except as compensated by this item, there will be no additional compensation for rock excavation necessitated by a change in grade or alignment.

1119.02 Construction Requirements. Excavate to the specified lower grade or altered alignment. Conform to all of the requirements of Items 1100 and 1101.

1119.03 Method of Measurement. GCWW will measure Additional Excavation by the volume (cubic yards or meters) of material in its original position prior to excavation as determined by field measurements.

The depth considered by a change in the specified profile grade is the depth below the bottom of the trench as shown on the plan profile when available. Otherwise, the depth considered is the nominal depth as specified in 1101.04. Trench width considered will be as specified in 1101.04.

The depth considered in the event of unused trench is the actual depth from the existing grade to the bottom of the trench. Trench width will be as specified in 1101.04.

Additional backfill required because of additional excavation is also compensated for in this item.

1119.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment required for the additional excavation as herein specified.

GCWW will compensate the Contractor for restoration of any unused trench. This Item does not cover excavation included as part of any other Contract item.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1119	Cubic Yard (meter)	Additional Excavation

Item 1120 Exploratory Excavation

1120.01	Description
1120.02	Materials
1120.03	Construction Requirements
1120.04	Method of Measurement
1120.05	Basis of Payment

1120.01 Description. This item covers the excavation of test holes that are of an exploratory nature as directed by the GCWW Construction Inspector. This item includes excavations necessary to determine locations of GCWW facilities, existing piping materials, locations of any utility facilities, or any other excavation designed to obtain information that will aid the progress of the project. This item does not include excavations within the limits of the proposed trench as defined in 1101.04 and 1101.05. Test holes are required on all utilities within 50 feet (15.2 m) of the last laid pipe. Test holes within the alignment of the proposed trench are included in the Contractor's unit bid for Item 1101.

1120.02 Material. Use material for backfilling that conforms to 1101.07, "Laying Pipe and Fittings - Backfilling." Use material for restoration that conforms to the requirements of the governing agency and comply with the restoration details on the approved Plans.

1120.03 Construction Requirements. Remove any sidewalk, street pavement, sod, or any other surface; excavate to determine the information for which the excavation was made; and backfill the excavation. Perform excavation by hand digging or by a mechanical means. Restore the excavated area upon completion of the test hole.

1120.04 Method of Measurement. GCWW will measure Exploratory Excavation by the volume of material (cubic yards or meters) in its original position prior to excavation as determined by field measurements.

Sidewalks, street pavement, sod, or any other surface will be included in this measurement.

1120.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment required for exploratory excavation as herein specified.

Locations to be explored will vary from areas within the roadway to areas outside of the roadway. Consider this in preparation of the unit bid.

This item does not cover excavation that is included as part of any other Contract items.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1120	Cubic Yard. (m ³)	Exploratory excavation

Item 1121 Filling Abandoned Water Works Structures

1121.01	Description
1121.02	Materials
1121.03	Construction
1121.04	Method of Measurement
1121.05	Basis of Payment

1121.01 Description. This item covers the labor, material, and equipment required to abandon existing Water Works structures as indicated on the Plans or as directed by the GCWW Inspector.

1121.02 Materials. Use backfill material, required for this operation, that is Low Strength Mortar backfill (GCWW approved). See 1101.071.

1121.03 Construction. Structures that are to be abandoned as a part of this project will be so noted on the Plans. All castings abandoned become the property of the Contractor. Remove abandoned castings from the job site.

The Contractor shall remove the walls to three (3) feet below pavement and break up the existing floor.

Backfill all remaining cavities with the proper material specified above.

1121.04 Method of Measurement. GCWW will measure Filling Abandoned Water Works Structures by the volume of backfill (cubic yards or cubic meters) required to fill the resulting cavities to the subgrade or ground surface.

1121.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to perform the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1121	Cubic Yards (cubic meters)	Filling Abandoned Water Works Structures

Item 1122 Removing Existing Manhole Curbs and Covers and Valve Boxes

1122.01	Description
1122.02	Material
1122.03	Construction
1122.04	Method of Measurement
1122.05	Basis of Payment

1122.01 Description. This item covers the labor, material and equipment required to remove existing manhole curbs and covers or valve boxes that are located in sod, pavement, or sidewalks; backfilling all remaining cavities and permanent restoration of surface.

1122.02 Material. Backfill material required for this operation is to be Low Strength Mortar flowable fill (CDF or Flash Fill – GCWW approved). See 1101.071.

1122.03 Construction. Remove existing manhole curbs and covers or valve boxes, including the telescope, when so directed by the GCWW Inspector. When the structure extends into the upper foot of the finished subgrade or ground surface, remove at a minimum of one foot below these limits. All castings abandoned become the property of the Contractor. Remove all castings from the Project.

Backfill the abandoned structure as described in 1122.02

Restore the disturbed pavement, sod, driveways or sidewalks so it conforms to the adjacent surface. Restore concrete walks or driveways from joint to joint.

1122.04 Method of Measurement. GCWW will measure Removing Existing Manhole Curbs and Covers and Valve Boxes by the number of each completed and accepted. When the backfill material of each manhole curb and cover removed exceeds two cubic yards, GCWW will compensate the Contractor for all additional material under Item 1121.

1122.05 Basis of Payment. Payment is full compensation for all labor, material and equipment necessary to perform the work herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1122	Each	Removing Existing Manhole Curbs and Covers
1122	Each	Removing Existing Valve Boxes

Item 1123 Changing Pipe Sewers

1123.01	Description
1123.02	Materials
1123.03	Construction
1123.04	Measurement
1123.05	Basis of Payment

1123.01 Description. This item covers furnishing all labor, material, tools, and equipment required to change the grade or alignment of pipe sewers and laterals of various sizes, allowing installation of water mains and appurtenances as shown on the Plans, or as directed by the GCWW Inspector.

GCWW has made every effort to depict the pipe sewer and lateral information on the Plans. When encountering a pipe sewer or lateral (not shown on the Plans) in the excavation requiring a change of grade or alignment for the installation of the water main, the Contractor will be compensated for the work under this bid item.

This work includes all necessary excavation, backfill, and restoration.

1123.02 Materials. Furnish material that conforms to the specifications stated in Item 603.

1123.03 Construction. Perform construction required for the changing of pipe sewers in a manner that conforms to Item 603, or to the satisfaction of the political subdivision having jurisdiction.

Be responsible for all pipe sewers disturbed in the completion of this project. Restore all pipe sewers exposed to an equal or better condition when finished with the specific work.

Any sewer pipe that is broken or disturbed due to the Contractor's operations will not be paid for unless such pipe, of necessity, must be changed in alignment or grade to allow the installation of water mains and appurtenances.

1123.04 Measurement. GCWW will be the sole judge in determining the amount of linear feet (meters) of pipe changed.

GCWW will measure Changing Pipe Sewers by the actual length of linear feet (meters) for each appropriate size measured along the invert, from the beginning to the end of the new pipe installed.

1123.05 Basis of Payment. Payment is full compensation for all labor, material, tools, and equipment required to change the pipe sewers and laterals of various sizes as specified herein.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1123	Linear Foot (meter)	Changing Pipe Sewer

Item 1124 Furnishing, Installing, and Maintaining Temporary Water Mains

1124.01	Description
1124.02	Materials
1124.03	Construction
1124.04	Measurement
1124.05	Basis of Payment

1124.01 Description. This item covers furnishing, hauling, and installing of temporary water mains where specified on the Plans, or where directed by the GCWW Director and restoration of all disturbed areas.

1124.02 Materials. The Special Provisions of the Contract Plans will contain detailed information concerning temporary water mains in those instances where no alternate material can be allowed.

When such information is not specified in the Special Provisions, submit to the GCWW Director, a proposed plan indicating the type of temporary piping to be used. The GCWW Director will approve, or disapprove, the proposed plan after considering the following data:

- A. Diameter of pipe.
- B. Pipe material. (New pipe or pipe previously used for potable water only.)
- C. Type of pipe joints.
- D. Method of installation.
- E. Sterilization provision.
- F. Adequate valving and fire hydrants.

GCWW will allow the Contractor to proceed with work only when, in the GCWW Director's opinion, the proposed plan meets the job requirements.

1124.03 Construction. Perform installation as indicated in the Special Provisions or as shown on the above-mentioned GCWW approved plan.

Remove the temporary water main from the jobsite when it is no longer needed.

Return water pipe furnished by the GCWW to the GCWW Distribution Storage Yard.

Perform all restoration as specified on the Contract Plans or as required by the agency of jurisdiction.

1124.04 Measurement. GCWW will measure Temporary Water Mains by the total lineal feet (meters) of temporary water main installed including specials and fittings, as measured along the centerline of the temporary water main.

1124.05 Basis of Payment. GCWW will compensate the Contractor for temporary water mains specifically indicated on the Contract Plans. Temporary water mains and service branches installed for the convenience of the Contractor, or such temporary work required to maintain adequate water for consumers and fire fighting purposes, will not be paid for. See 1101.053.

Payment is full compensation for all labor, material, and equipment to furnish, install, maintain, and removal the temporary water main as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1124	Foot (meter)	Furnishing, Installing, and Maintaining Temporary Water Mains
1124	Foot (meter)	Installing and Maintaining Temporary Water Mains

Item 1125 Resetting Existing Valve Boxes Complete

1125.01	Description
1125.02	Construction
1125.03	Measurement
1125.04	Basis of Payment

1125.01 Description. This item covers resetting of existing valve box hoods, lids, and telescopes, where necessary to conform to the established lines and grades of the pavement.

1125.02 Construction. Make the necessary excavation and reset the telescope and hood to conform to 1116.02.

Do not reset existing valve boxes that are not in good condition, as determined by the GCWW Inspector. Install a new valve box in accordance with Item 1116.

When it is necessary to raise the hood over six inches (152 mm), remove the hood and place a new telescope, or portion thereof, over the existing telescope.

When it is necessary to lower the hood over six inches (152 mm), remove the hood and cut off the telescope as directed.

If any part of the valve box assembly is damaged or broken by the Contractor's operations, replace the damaged portion at no cost to the GCWW.

1125.03 Measurement. GCWW will measure Resetting Valve Boxes Complete by the number of each completed and accepted.

1125.04 Basis of Payment. Payment is full compensation for all labor, materials, and equipment required to complete the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1125	Each	Resetting Existing Valve Boxes Complete

Item 1126 Installing and Connecting Copper Service Pipe

1126.01	Description
1126.02	Materials
1126.03	Construction
1126.04	Method of Measurement
1126.05	Basis of Payment

1126.01 Description. This item covers the installation of copper service pipe, of various sizes, where indicated on the Plans or as directed by the GCWW Inspector.

1126.02 Materials. Furnish all new service pipe and fittings required to complete the work as shown, unless otherwise indicated on the Plans. Submit material certification for copper pipe and fittings to GCWW prior to installation.

Wrap services with polyethylene in accordance with GCWW Standard Drawings 105-5 and 105-5A.

1126.03 Construction. Excavate the trench to provide 3-1/2 feet (1.07 meters) of cover over the water service.

Install the new pipe and fittings, make all necessary joints and connections, and properly backfill the trench, and complete restoration.

In the event that a copper to lead adapter does not fit the existing lead service pipe, furnish the necessary labor and material to wipe the joint. No additional payment will be made for a wiped joint.

Disconnect all existing service branches within the trench of the renewed service branch as described under Item 1130. If the existing ferrule is not within the same trench, GCWW will compensate to disconnect the existing service branch under Item 1130.

Remove or break out existing curb or roadway box as needed. If the box is in a concrete walk or in permanent roadway, remove the lid and fill the abandoned box with concrete and trowel finish. If the box is located in a dirt or sod area, remove or break out the entire top

| section of the box and backfill with earth.

New service branch installation for property not presently being served will be installed by the GCWW at locations, as the property owner may desire, upon proper application and payment of charges.

1126.04 Method of Measurement. GCWW will measure Installing Copper Service Pipe by the actual number of lineal feet (meters) of service pipe and fittings installed.

1126.05 Basis of Payment. Payment is full compensation for all labor, material and equipment required to perform the work as herein specified.

Include the hauling of service branch material furnished by GCWW in the unit price bid. No payment will be made under Item 1102.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1126	Lineal Foot (meter)	Hauling, Installing, and Connecting ____" (cm) Copper Service Pipe
1126	Lineal Foot (meter)	Furnishing, Installing, and Connecting ____" (cm) Copper Service Pipe

Item 1127 Lowering Existing Service Branches

1127.01	Description
1127.02	Materials
1127.03	Construction
1127.04	Measurement
1127.05	Basis of Payment

1127.01 Description. This item covers the lowering of existing copper service branches, regardless of size, where shown on the Plans or as directed by the GCWW Inspector.

1127.02 Construction. Excavate the trench and lower the existing service branch to a minimum depth of 3-1/2 feet (1.07 m) below the finished surface. Cut the pipe, disconnect the ferrule, or stop cock, when necessary to perform the operation. Perform lowering in a careful manner.

Be responsible for any damage to the service branch that may occur during the lowering operation.

Firmly backfill the trench after the service branch has been lowered and adjusted to its final position.

If the elevation of the existing service branch indicates lowering is not necessary, GCWW will compensate for the excavation under Item 1120.

1127.03 Measurement. GCWW will measure Lowering Service Branches based on the total lineal feet (meters) of service branch lowered.

GCWW will compensate for additional new service pipe required in the lowering of any service under Item 1126. GCWW will compensate for resetting of the curb or roadway box under Item 1132.

1127.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to perform the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1127	Linear Foot (meters)	Lowering Existing Service Branches

Item 1128 Reconnecting Existing Service Branches

1128.01	Description
1128.02	Materials
1128.03	Construction
1128.04	Measurement
1128.05	Basis of Payment

1128.01 Description. This item covers reconnecting of existing service branches, including the installation of copper service pipe when required for grade differential, from one main to another where shown on the Plans or as directed by the GCWW Inspector.

Reconnects only apply when the newly installed water main crosses the existing service branch. Where the newly installed main does not cross the existing service branch, compensation will be made under Item 1126.

Locate the curb/roadway box serving the branch when reconnecting the service branch. Replace or reset, as directed by the GCWW Inspector, curb/roadway boxes not found or found to be broken, shifted, or not to grade. This work shall be paid for under Item 1131 or 1132, as applicable.

1128.02 Materials. Furnish all new service pipe and fittings required to complete the work as shown, unless otherwise indicated on the plans. Submit material certification for service pipe and fittings prior to installation.

1128.03 Construction. Make all necessary excavations, disconnect the existing service branch from the old ferrule, and reconnect it to the new ferrule.

Furnish labor, tools, and material necessary to make the joints and to complete the reconnection.

In the event that a copper to lead adapter does not fit the existing lead service pipe, furnish the necessary labor and material to wipe the joint. No additional payment will be made for a wiped joint.

Install any new service pipe required to complete the reconnection.

Wrap services with polyethylene in accordance with GCWW Standard Drawings 105-5 and 105-5A.

Perform restoration of all disturbed surfaces.

1128.04 Measurement. GCWW will measure Reconnecting Service Branches by the actual number of each size completed and accepted.

1128.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to perform the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1128	Each	Reconnecting Existing 5/8-inch thru 1-inch (15.9-mm to 25.4-mm) Service Branches
1128	Each	Reconnecting Existing 1-1/2-inch & 2-inch (38.1-mm to 50.8-mm) Service Branches

Item 1129 Installing Stop Cocks in Existing Lines

1129.01	Description
1129.02	Materials
1129.03	Construction
1129.04	Measurement
1129.05	Basis of Payment

1129.01 Description. This item covers installing of stop cocks in existing service branches where shown on the Plans or as directed by the GCWW Inspector.

1129.02 Materials. Furnish all new service pipe and fittings required to complete the work as shown, unless otherwise indicated on plans. Submit material certification for service pipe and fittings prior to installation.

1129.03 Construction. Make the necessary excavations, install the new stop cock where indicated, check the existing stop cock joints for tightness in the presence of the GCWW Inspector, firmly backfill the excavations, and restore all disturbed surfaces. This item shall include the installation of a short piece of copper pipe when necessary.

1129.04 Measurement. GCWW will measure Installing Stop Cocks In Existing Lines by the actual number of each size completed and accepted.

1129.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to complete the work as herein specified.

Include the hauling of service branch material furnished by GCWW in the unit price bid. No payment will be made under Item 1102.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1129	Each	Hauling and Installing ____" (cm) Stop Cocks in Existing Lines
1129	Each	Furnish and Install ____" (cm) Stop Cocks in Existing Lines

Item 1130 Disconnecting Existing Service Branches 5/8" (15.9 mm) Through 2" (50.8 mm)

1130.01	Description
1130.02	Construction
1130.03	Service Branches with Service Saddles
1130.04	Measurement
1130.05	Basis of Payment

1130.01 Description. This item covers disconnecting of existing service branches where required, removal of existing curb, roadway, or valve boxes, backfilling, and restoration of all surfaces. Branches to be disconnected are shown on the Plans or indicated by the GCWW Inspector.

1130.02 Construction. The GCWW Inspector will facilitate a scheduled shut down of the water main. Excavate down to the ferrule at the water main. Once the water main is shut down, disconnect the service line at the ferrule. Remove the ferrule from the water main and install a tapered brass plug supplied by the Contractor.

1130.021 Service Branches with Service Saddles. In those instances where a service saddle is part of the service branch, expose the connection to the water main, remove the service saddle, and furnish and install a stainless steel leak clamp. After the service line has been disconnected, backfill the excavation and perform permanent restoration.

Remove or break out existing curb, roadway, or valve box. If the box is in a concrete walk,

or in permanent roadway, remove the lid and place a patch of concrete over the opening. If the box is located in a dirt or sod area, remove or break out the entire top section of the box and backfill with earth.

Perform restoration of the area surrounding the valve box conforming to the street restoration requirements of the appropriate political agency or as indicated on the Plans.

1130.03 Measurement. GCWW will measure Disconnecting Service Branches by the actual number of each completed and accepted.

Service branches disconnected when renewing service branches as part of Item 1126 will not be paid for if the ferrule is in the same trench.

1130.04 Basis of Payment. Payment is full compensation for all labor, and equipment required to perform the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1130	Each	Disconnecting Existing 5/8-inch thru 2-inch (15.9-mm thru 50.8-mm) Service Branches

Item 1131 Installing Curb and Roadway Boxes

1131.01	Description
1131.02	Construction
1131.03	Measurement
1131.04	Basis of Payment

1131.01 Description. This item covers installing of curb or roadway boxes as indicated on the Plans or as directed by the GCWW Inspector.

1131.02 Construction. Make the necessary excavation, remove the old box if required, and set the new box in a vertical position directly over the stop cock. Set the base of the box on a wood block or brick foundation to prevent the transferring of any loads from the box to the service line. Adjust the box to the proper grade and carefully tamp the backfill around the box. Properly restore all disturbed surfaces.

1131.03 Measurement. GCWW will measure Installing Curb and Roadway Boxes by the actual number completed and accepted.

1131.04 Basis of Payment. Payment is full compensation for all labor, tools, materials, and equipment to complete the work as herein specified.

Include the hauling of any curb and roadway boxes furnished by GCWW in the unit price bid. No payment will be made under Item 1102.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1131	Each	Hauling and Installing Curb and Roadway Boxes
1131	Each	Furnishing and Installing Curb and Roadway Boxes

Item 1132 Resetting Existing Curb and Roadway Boxes

1132.01	Description
1132.02	Construction
1132.03	Measurement
1132.04	Basis of Payment

1132.01 Description. This item shall cover resetting existing curb and roadway boxes where necessary to conform to the established lines and grades of the street.

1132.02 Construction. Make the necessary excavation, reset the box in a vertical position directly over the stop cock, and adjust it to conform to the proper grade. Set the base of the box on a wood block or brick foundation to prevent the transferring of any loads from the box to the service line. Firmly tamp around the box. Restore all disturbed surfaces.

Do not reset existing curb and roadway boxes that are in poor condition, as determined by the GCWW Inspector. Install new boxes, furnished by the GCWW, in conformance with the provisions of Item 1131 as part of unit bid price for Item 1132.

Furnish and Install new boxes at no expense to GCWW when existing boxes are damaged or broken by the Contractor's operations.

1132.03 Measurement. GCWW will measure Resetting Curb and Roadway Boxes by the actual number completed and accepted.

1132.04 Basis of Payment. Payment is full compensation for all excavation, material, backfill, restoration, and labor required.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1132	Each	Resetting Existing Curb and Roadway Boxes

Item 1133 Furnishing and Installing Frost-Proof Meter Settings Complete

1133.01	Description
1133.02	Materials
1133.03	Construction
1133.04	Measurement
1133.05	Basis of Payment

1133.01 Description. This item covers the furnishing and installing of a standard frost-proof meter setting complete, as shown on the Plans or as directed by the GCWW Inspector.

1133.02 Materials. Furnish material that complies with the "Rules and Regulations of the GCWW" governing service branches and meter settings.

1133.03 Construction. Make the necessary excavations, connect the ends of service pipe, install the tile, hood, meter, and appurtenances to conform to the GCWW Standard Drawings "Rules and Regulations of the GCWW" in the proper location, backfill all openings, and restore all disturbed surfaces.

Set the meter box tile on bricks to prevent the transferring of any loads from the tile to the service line. Disconnect any sub-standard piping and install new service pipe.

1133.04 Measurement. GCWW will measure Furnishing and Installing Frost-Proof Meter Settings by the actual number of each size completed and accepted.

Any additional service pipe, other than that required to reconnect the ends of the branch where the original meter setting was removed, which must be installed to conform to the "Rules and Regulations of the GCWW" will be paid for under Item 1126.

1133.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to perform the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1133	Each	Furnishing and Installing ____" (cm) Frost-Proof Meter Setting Complete.

Item 1134 Relocating Existing Frost-Proof Meter Settings

1134.01	Description
1134.02	Construction
1134.03	Measurement
1134.04	Basis of Payment

1134.01 Description. This item covers furnishing all labor, tools, material, and equipment necessary to remove an existing frost-proof meter setting and relocate it to new location as indicated on the Plans or as directed by the GCWW Inspector.

1134.02 Construction. Make the necessary excavations, carefully remove the existing tile, hood, meter and appurtenances, relocate them in the new location specified, dispose of old yoke, furnish and install new yoke within meter setting, install a curb stop (if required). If no curb box exists, furnish and install new curb box. Backfill and restore all openings. Perform all work conforming to the requirements of 1133.03. Reconnect the service branch ends. Disconnect and replace any sub-standard piping.

1134.03 Measurement. GCWW will measure Relocating Existing Frost-Proof Meter Setting by the actual number of each size completed and accepted.

Any additional service pipe, other than that required to reconnect the end of the branch where original meter setting was removed, which must be installed to conform to "Rules and Regulations of the GCWW" will be paid for under Item 1126.

1134.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to complete the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1134	Each	Relocating Existing ____" (cm) Frost-Proof Meter Setting

Item 1135 Resetting Existing Frost-Proof Meter Settings

1135.01	Description
1135.02	Construction
1135.03	Measurement
1135.04	Basis of Payment

1135.01 Description. This item covers resetting of an existing frost-proof meter setting to the proper grade, where shown on the Plans or as directed by the GCWW Inspector.

1135.02 Construction. Make the necessary excavation, carefully remove the tile, hood, meter and its appurtenances, and add or remove any pipe and fittings to adjust the meter to the proper grade, and reset the tile and hood.

Set the meter box tile on bricks to prevent the transferring of any loads from the tile to the service line. Complete the installation conforming to the GCWW Standard Drawings.

1135.03 Measurement. GCWW will measure Resetting Existing Frost-Proof Meter Setting by the actual number of each size completed and accepted.

1135.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to complete the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1135	Each	Resetting Existing ____" (cm) Frost-Proof Meter Settings

Item 1136 Furnishing and Installing Frost-Proof Meter Setting Appurtenances

1136.01	Description
1136.02	Materials
1136.03	Construction
1136.04	Measurement
1136.05	Basis of Payment

1136.01 Description. This item covers furnishing and installing of various frost-proof meter setting appurtenances as shown on the Plans or as directed by the GCWW Inspector.

1136.02 Materials. Furnish all appurtenances complying with the following descriptions:

Angle Valves - locking padlock wing on inlet valve and test cock on outlet valve. 5/8-inch through one-inch (15.9 mm through 25.5 mm).

Meter Yokes - 5/8-inch through one-inch (15.9 through 25.4 mm).

Flanged Angle Valves - flanged angle valves with padlock wing. - 1-1/2-inch through two-inch (38.1 mm through 50.8 mm).

Frost-Proof Meter Box - double-lid frost-proof meter box - 5/8-inch through two-inch (15.9 mm through 50.8 mm).

Lids - inner or outer (as specified) lids for frost-proof meter box - 5/8-inch through two-inch (15.9 mm through 50.8 mm).

Meter Box Tiles - vitrified, concrete, or approved Polymer frost-proof meter box tile, 20 inches (508 mm), 24 inches (610 mm), 30 inches (762 mm) diameter.

1136.03 Construction. Install the various appurtenances as required to conform to "Rules and Regulations of the GCWW" and GCWW Standard Drawings.

1136.04 Measurement. GCWW will measure each frost-proof meter setting appurtenance by the actual number of each size completed and accepted.

1136.05 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to complete the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1136	Each	Furnishing and Installing ____" (cm) Angle Valves
1136	Each	Furnishing and Installing ____" (cm) Meter Yokes
1136	Each	Furnishing and Installing ____" (cm) Flanged Angle Valves
1136	Each	Furnishing and Installing Lids for ____" (cm) Setting
1136	Each	Furnishing and Installing Double-Lid Frost-Proof Meter Box for ____" (cm) Setting
1136	Each	Furnishing and Installing ____" (cm) Meter Box Tile

**Item 1137 Furnishing and Installing or Relocating Existing
Meter Settings (Domestic or Fire), Backflow Preventers,
and Appurtenances and Construct Pit**

1137.01	Description
1137.02	Construction
1137.03	Measurement
1137.04	Basis of Payment

1137.01 Description. This item covers furnishing and installing, relocating, and resetting of meter settings, backflow preventers, and any other related appurtenances and constructing the associated pit.

1137.02 Construction. As indicated on the plans, furnish new meter settings, backflow devices, and any other associated appurtenances and install in a new pit in accordance with the appropriate GCWW Standard Drawing and as directed by the GCWW. These meter settings may be fire, domestic, or combination.

As also indicated on the plans, some of these meter settings, etc. may be relocated from an existing pit into a new meter pit to be constructed by the Contractor under the appropriate GCWW Standard Drawing and as directed by the GCWW. Furnish and install new meter settings and appurtenances when the existing meter settings and appurtenances do not meet current GCWW standards or are not suitable for relocation. Properly abandon the existing pit by removing the roof slab, sidewalls to a depth of four feet (1.22 meters) below the roof slab, and breaking up the pit floor. Properly backfill all voids and restore all disturbed areas conforming to project specifications.

1137.03 Measurement. GCWW will measure each by the actual number of each size completed and accepted.

1137.04 Basis of Payment. Payment is full compensation for all labor, material, and equipment required to complete the work as herein specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1137	Each	Furnishing and Installing ___" (cm) Fire and/or Domestic Meter Setting Complete and Construct Pit
1137	Each	Relocate Ex. ___" (cm) Meter Setting and Appurtenances and Construct Pit

Item 1138 Removing Curb and Roadway Boxes

1138.01	Description
1138.02	Construction
1138.03	Measurement
1138.04	Basis of Payment

1138.01 Description. This item covers removing existing curb and roadway boxes, backfilling, and restoration of all surfaces. Boxes to be removed are shown on the plans or indicated by the GCWW Inspector.

1138.02 Construction. Remove the existing curb or roadway box to one foot (305 mm) below the existing surface. Restore the disturbed pavement, walk, driveway or sod so that it conforms to the adjacent surface. Restore concrete walks or driveways from joint to joint.

1138.03 Measurement. GCWW will measure Removing Curb and Roadway Boxes by the actual number of each completed and accepted.

1138.04 Basis of Payment. Payment is full compensation for all labor, material and equipment required to do the work as specified.

GCWW will pay for accepted quantities at the Contract prices as follows:

Item	Unit	Description
1138	Each	Removing Curb and Roadway Boxes